



EonStor® S16E-R1240 S16E-G1240

10G iSCSI to SAS-I / SATA-II RAID System

Installation and Hardware Reference Manual

Version 1.2 (Dec 2010)



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Warnings and Certifications



RESTRICTED ACCESS LOCATION:

This equipment is intended to be installed in a RESTRICTED ACCESS LOCATION only.

- Access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and
 - Access is by an authorized person through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.
-



ELECTRIC SHOCK WARNING!

To Prevent Electric Shock:

1. Access to this equipment is granted only to trained operators and service personnel who have been instructed of and fully understand the possible hazardous conditions and the consequences of accessing non-field-serviceable units, e.g., system backplane or power supplies.
 2. Unplug the system before you move it or when it has become damaged.
-



RELIABLE EARTHING!

Particular attention should be given to prepare reliable earthing with the power supply connections other than direct connections to the branch circuit (e.g., use of power strips). The AC power cords provide the main earth connection. Check proper grounding before powering on the enclosure.



OVERLOADING PROTECTION!

1. The enclosure should be installed according to specifications on a chassis label. Provide a suitable power source with electrical overload protection.
 2. Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
-



BATTERY USE WARNING!

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to local ordinance.



THERMAL PRECAUTIONS:

1. If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Appropriate measures, such as increasing airflow, should be available to maintain the temperature below 35°C.
 2. The openings on the enclosure are for air convection. **DO NOT COVER THE OPENINGS.**
 3. To comply with safety, emission, and thermal requirements, all module bays should be populated with plug-in modules. The system should not be operated with the absence of any covers.
-



HANDLING PRECAUTIONS:

1. The system can either be installed into a standard EIA-310 19" rack cabinet or placed on a desktop. Mechanical loading of the enclosure should be carefully handled to avoid hazardous condition. A drop or fall could cause injury.
 2. Lay this system on a reliable surface with desktop installation. A drop or fall can cause injury.
 3. Mounting this enclosure requires two people.
 4. The enclosure can weigh up to 34.4lb (15.64kg) without disk drives. With disk drives loaded, the enclosure can weigh up to 52.4lb (24kg). A reliable surface should be available to support this weight.
 5. Disk drives should be installed after the enclosure is securely installed.
-

FCC (applies in the U.S. and Canada)

FCC Class A Radio Frequency Interference Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device may accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

WARNING:

A shielded power cord is required in order to meet FCC emission limits and also to prevent interference to nearby radio and television reception.

Use only shielded cables to connect I/O devices to this equipment. You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.



This device is in conformity with the EMC.



(Certified Worldwide)

This device meets the requirements of the CB standard for electrical equipment with regard to establishing a satisfactory level of safety for persons using the device and for the area surrounding the apparatus. This standard covers only safety aspects of the above apparatus; it does not cover other matters, such as style or performance.



For Power Supplies' compatibility to China Compulsory Certification.

China RoHS

In Compliance with AeA China RoHS Regulations (SJ/T 11364-2006)

有毒有害物质或元素的名称及含量

部件名称	有毒有害物质或元素					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬(Cr6+)	多溴联苯(PBB)	多溴二苯醚(PBDE)
PCBA	X	○	○	○	○	○
机壳机架	X	○	○	○	○	○

○:表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006规定的限量要求以下。
X:表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006规定的限量要求。

说明：

于PCBA部分：

1. 主动(半导体)组件：高熔点焊料合金中含有铅
2. 被动组件：电子陶瓷组件含有铅
3. 组件脚(脚距小于0.65mm之主、被动组件及连接器)含有铅
4. LCD模块所使用的光学玻璃含有铅

于机壳机架部分：

机壳机架中的钢合金、铝合金及铜合金含有铅

* 上述项目皆碍于技术上不够成熟、经济上及可靠度上不可行而含有过量有毒物质



D33225

ITE BSMI Class A, CNS 13438 (for Taiwan)

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。



This device is in conformity with UL standards for safety.



M004

Инструкция по безопасности

Модель:

iSCSI to SAS/SATA 3U/16Bay RAID Subsystem, Models ESS16ER1240xxxxxx, ESS16E-G1240xxxx, where "x" can be "0-9", "A-Z", blank, or dash "-" for marketing purpose and no impact safety related critical components and constructions.

1. Перед использованием оборудования внимательно прочтите инструкцию.
2. Сохраняйте инструкцию для дальнейшего использования в работе.
3. Не допускайте попадания влаги на изделие.
4. Устанавливайте оборудование на устойчивую поверхность. Падение может нанести ущерб оборудованию.
5. Соблюдайте климатические требования, использование оборудования при температуре окружающей среды выше 50°C, может привести к выходу оборудования из строя.
6. Размещайте шнур питания в недоступном для пользователя месте. Запрещается ставить на шнур питания какие-либо предметы.
7. При работе с оборудованием необходимо учитывать все предупреждения и замечания.
8. Если оборудование не используется в течении длительного времени, отключите его от сети питания.

9. Запрещается вскрывать оборудование. Оборудование может вскрываться только квалифицированным персоналом.
10. При возникновении одного из повреждений оборудования вызовите обслуживающий персонал:
 - a. Повреждение шнура питания или вилки.
 - b. Оборудование не работает или его работа не соответствует инструкции пользователя.
 - e. Оборудование повреждено.
 - f. Оборудование имеет очевидный признак поломки.
11. Источник питания должен быть установлен в соответствии с инструкцией. Ток нагрузки и выходная мощность не должны превышать указанных в спецификации.



Infortrend is committed to being properly prepared and taking all the necessary steps that will result in our compliance with the new European directive, RoHS (2002/95/EC), on or before the specific dates set forth in those applicable laws and regulations. Infortrend is applying its own internal efforts and expertise and is working closely with customers and suppliers to achieve compliance while maintaining an uninterrupted supply of quality products. Infortrend is currently investigating, evaluating, and qualifying our materials and components to ensure that products sold on or after 1 July 2006, in such territory, are in compliance with the above regulations.



Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By proper waste handling of this product you ensure that it has no negative consequences for the environment and human health, which could otherwise be caused if this product is thrown into the garbage bin. The recycling of materials will help to conserve natural resources.

For more details about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

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|

Safety Precautions

Precautions and Instructions

- Prior to powering on the system, ensure that the correct power range is being used.
- If it is necessary to transport the system, repackage all disk drives separately in the drive trays and in the original package foam blocks. If using the original package material, other replaceable modules can stay within the enclosure.
- The EonStor system comes with 16 drive bays. Leaving any of these drive bays empty will greatly affect the efficiency of the airflow within the enclosure, and will consequently lead to the system overheating, which can cause irreparable damage.
- If a module fails, leave it in place until you have a replacement unit and you are ready to replace it.
- Airflow Consideration: The system requires an airflow clearance, especially at the front and rear. A clearance of at least 18 to 20 centimeters is required at the rear side and any objects blocking the exhaust airflow, e.g., cables dangling at the fan outlet, should be avoided.
- Handle system modules using the retention screws, eject levers, and the metal frames/face plates. Avoid touching PCB boards and connector pins.
- To comply with safety, emission, or thermal requirements, none of the covers or replaceable modules should be removed. Make sure that all enclosure modules and covers are securely in place during operation.
- Be sure that the rack cabinet into which the system chassis will be installed provides sufficient ventilation channels and airflow circulation around the system.
- Provide a soft, clean surface to place your system on before working on it. Servicing on a rough surface may damage the exterior of the chassis.
- If it is necessary to transport the system, repackage all drives separately.
- Dual-redundant controller models come with two RAID controllers that should always be present. Single-controller models come with a single RAID controller and a metal sheet is placed over the lower controller bay at the rear of the system. Since single-controller models cannot be upgraded, this metal sheet should NEVER be removed.

ESD Precautions

Observe all conventional anti-ESD methods while handling system modules. The use of a grounded wrist strap and an anti-static work pad are recommended. Avoid dust and debris in your work area.

About This Manual

This manual:

- Introduces the EonStor system series.
- Describes all major components in the system.
- Provides recommendations and details about the hardware installation process.
- Describes how to monitor system operating statuses.
- Describes how to maintain the system.

This manual does not:

- Describe components that are not user-serviceable.
- Describe the configuration options of firmware, using terminal emulation programs, or the SANDWatch GUI that came with your system.
- Give a detailed description of the RAID processing units or the RAID controllers within the system.

Revision History

Rev. 1.0: Initial release.

Rev. 1.1: Removed iSCSI 10G direct-attached topologies. They are not supported.

Rev. 1.2: Removed references to low-cost copper cables and SFP+ transceivers from Section 3.1.

Who should read this manual?

This manual assumes that its readers are experienced with computer hardware installation and are familiar with storage enclosures.

Related Documentation

- Generic Operation Manual (firmware operation via LCD keypad and terminal emulation)

- EonStor Series Configuration Planning Guide
- Troubleshooting Guide
- SANWatch User's Manual
- Embedded RAIDWatch User's Manual
- Quick Installation Guide

These documents are included in the product utility CD that came with your system package.

Conventions

Naming

From this point on and throughout the rest of this manual, the EonStor series is referred to as simply the “system” or the “system” and EonStor is frequently abbreviated as “ES.”



Important Messages

Important messages appear where mishandling of components is possible or when work order can be mis-conceived. These messages also provide important information associated with other aspects of system operation. The word “important” is written as “**IMPORTANT**,” both capitalized and bold and is followed by text in italics. The italicized text is the message to be delivered.



Warnings

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text in italics. The italicized text is the warning message.



Cautions

Cautionary messages should also be heeded to help you reduce the chance of losing data or damaging the system. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.



Notes

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help you avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

Lists

Bulleted Lists: Bulleted lists are statements of non-sequential facts. They can be read in any order. Each statement is preceded by a round black dot “•.”

Numbered Lists: Numbered lists are used to describe sequential steps you should follow in order.

Software and Firmware Updates

Please contact your system vendor or visit Infortrend’s FTP site (<ftp.infortrend.com.tw>) or VIProom service (requires privilege account) site for the latest software or firmware updates. **NOTE** that the firmware version installed on your system should provide the complete functionality listed in the specification sheet/user’s manuals. We provide special revisions for various application purposes. Therefore, DO NOT upgrade your firmware unless you fully understand what a firmware revision will do.

Problems that occur during the updating process may cause irrecoverable errors and system down time. Always consult technical personnel before proceeding with any firmware upgrade.

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Chapter 1

Introduction

1.1 Product Overview

1.1.1 Introduction

This chapter briefly introduces the S16E 10G iSCSI-to-SAS/SATA-II storage system. The S16E system comes with two (2) 10 Gigabyte Ethernet iSCSI host ports on each of the dual-active RAID controllers and delivers unmatched bandwidth and throughput for applications within a IP SAN (Storage Area Network).



Figure 1-1: S16E-R/G1240 System

The S16E's 10G iSCSI host interfaces support backward compatibility with GbE devices that protect existing investments in infrastructure and training. Powered by a 6th-generation ASIC667 RAID engine and a dual-CPU core design, the S16E delivers twice the read performance, one half more on write performance, and significant enhancement on I/Os per second than its ASIC400 predecessors. Built around a pure PCI-E architecture, the S16E also excels in throughput-intensive applications.

The iSCSI host ports receive SFP+ 850 or higher-nanometer multi-mode transceivers for a cabling distance of up to 300 meters. The SFP+ cabling is also the most cost-efficient among all 10G Ethernet cabling types. Compared with GbE, 10G Ethernet supports larger scale implementations for bandwidth-intensive applications in today's multiple-core servers and virtualized environments. 10G Ethernet also allows easier configurations for business continuity and disaster recovery designs.

Another advantage of 10G Ethernet connectivity is that the ubiquity of Ethernet reduces equipment and management costs comparing with the highly specialized Fibre Channel components.

The system delivers extreme performance that results from the combined performance of multiple disk drives, the level of data protection, and adaptability unseen elsewhere in just a 3U profile. Featuring all Infortrend's well-acclaimed RAID reliability, the S16E system provides a reliable platform for a wide variety of storage operations such as disk farm, data-mining, streaming video, medical

imaging, centralized applications, non-linear editing for Audio/Video industry, or strategically placed as a shared storage over SAN.

The EonStor ASIC667 series models now use common components, e.g., PSU and BBU, to minimize logistic efforts. The traditional battery backup is replaced by an innovative CBM (Cache Backup Module) methodology. Cached data is distributed to flash SSD with the support of Li-Ion BBU in the event of power outage. Because of a shorter discharge time, BBU life expectancy is extended to 3 years, and data is safely kept in flash memory regardless of the traditional 72 hours limitation.

Along with the 80+ efficiency PSUs, the embedded firmware features intelligent algorithms, such as power-saving modes and exiled drive handling, making this model a greener choice.

This S16E system is housed in a 3U-profile chassis featuring a high-density architecture that supports up to sixteen (16) hot swappable, SAS or SATA-II hard drives. The system is managed by active-active or a single RAID controller. The default 1GB DDR-II memory can be upgraded to a 2GB capacity module to support complicated applications that hold numerous ID/LUN combinations.

In addition to the ease of implementation, the S16E also supports capacity expansion via its SAS links by attaching up to 6 S16S-J1000 JBODs. If using 1TB size SATA drives in a combination of single-controller RAID and JBOD, a configuration can reach a maximum capacity of 112TB.

Model Variations

Model	Controllers	Controller Configuration	Host Ports
S16E-R1240	IFT-83SE12RF16MA x 2	Redundant	4
S16E-G1240	IFT-83SE12GF16MA x 1	Single	2

- **S16E-R1240:** This model comes with redundant RAID controllers. The dual-controller configuration corresponds with SAS drives' dual-ported design and each manages a separate SAS domain for higher fault tolerance. The dual-controller model supports all necessary features such as synchronized cache and the transparent failover/failback capability.
- **S16E-G1240:** The G1240 comes with one (1) RAID controller. This model cannot be upgraded into a dual-redundant configuration by adding a partner RAID controller. Except for controller redundancy, the single-controller configuration

supports all advanced RAID technologies and fault tolerance by redundant configuration of other modules.

1.1.2 Enclosure Chassis

1.1.2.1 Chassis Overview

The S16E RAID storage is housed in a 3U robust chassis that is divided into the front and the rear sections. Key components are either accessed through the front (see **Figure 1-2**) and rear panels. The enclosure chassis can be mounted into a standard 19-inch rack or enclosure cabinet using rackmount rails that are separately purchased.



NOTE:

Components accessed through the front panel are referred to as **“Front Panel Components”** and components accessed through the rear panel are referred to as **“Rear Panel Components.”**

1.1.2.2 Physical Dimensions

The S16E comes in a 3U chassis with the following dimensions:

- With handles and PSU protrusions: 482.6mm (W) x 131mm (H) x 531.64mm (L) (19 x 5.2 x 20.9 inches)
- Without handles and PSU protrusions: 445mm (W) x 130mm (H) x 514.04mm (L) (17.5 x 5.1 x 20.1 inches)

1.1.2.3 Front Panel Overview

The front section of the system features a 4x4 layout for sixteen (16) 3.5-inch disk drives. The two (2) handles on the front of the system enable you to easily extract the chassis from a rack or cabinet. The front view is shown below. A description of each front panel component is given below:

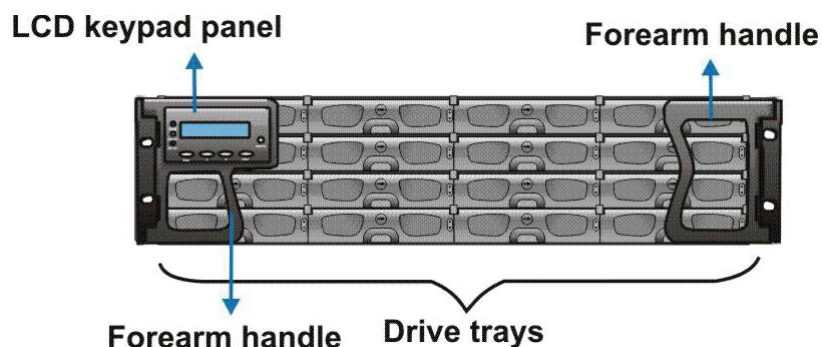


Figure 1-2: S16E Front View

The front panel components include:

- **Drive bays with drive tray canisters:** The drive bays accommodate either SAS or SATA-II 3.5" disk drives.
- **Forearm handles:** The system has right- and left-side handles for easier rackmount handling.
- **LCD Keypad Panel:** The 16 characters x 2 rows LCD displays system event messages, and allows configuration of RAID storage and firmware options using the push buttons on it.

1.1.2.4 Hard Drive Numbering

The front section of the S16E enclosure houses sixteen (16) hard drives in a 4x4 configuration. When viewed from the front, the drive bays (slots) are numbered 1 to 16 from left to right and then from top to bottom.

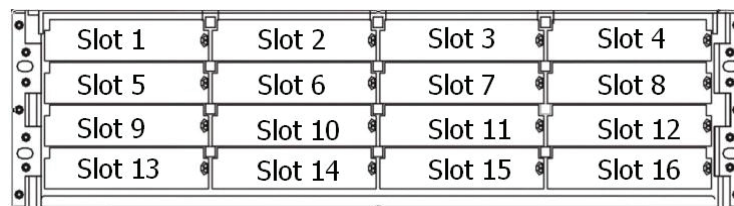


Figure 1-3: Hard Drive Numbering

Knowing the tray numbering sequence is extremely important when you replace a failed drive. If a RAID5 array already has a failed drive, and you accidentally remove the wrong drive, data loss will occur.

1.1.2.5 Rear Panel Overview

A rear view of the system is shown below. Descriptions of each rear panel component are given in the following sections:

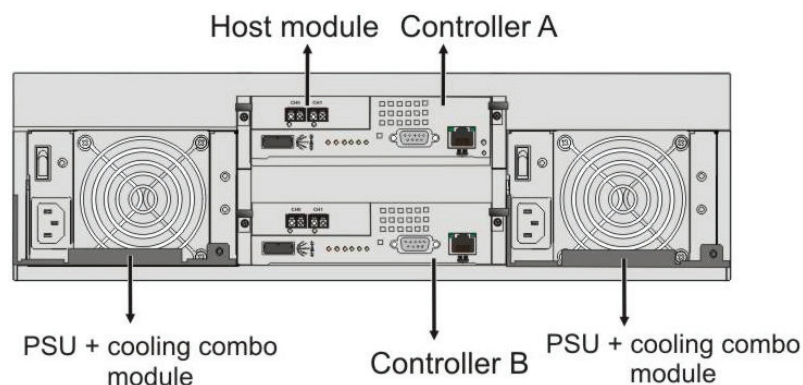


Figure 1-4: S16E-R1240 Rear View

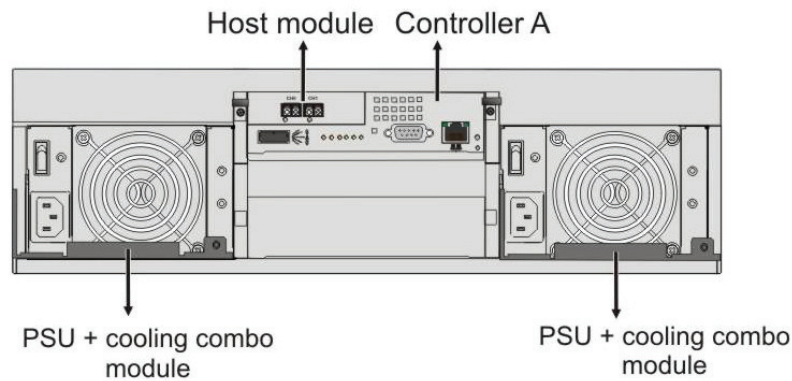


Figure 1-5: S16E-G1240 Rear View

The enclosure rear section accommodates the following components:

- **RAID controller module(s):** The RAID controller module manages all functionalities provided with the system, and all interface connectors are provided on the controller faceplates. (See **Section 1.2.3**)
- **CBM module:** CBM modules come as standard equipment for the redundant-controller R1240 model, and as an optional module for the single-controller G1240. The BBU sustains unfinished writes cached in memory and cached data will be distributed to a flash module during a power outage in order to prevent data loss. (See **Section 1.2.6**)
- **PSU modules:** The hot-swappable PSUs receive 110 or 240V single-phase power and deliver +5V, +12V, and +3.3V power to the system. A power switch is located on each PSU to turn the system on and off. (See **Section 1.2.7**)
- **Cooling modules:** The redundant cooling modules ventilate the system to maintain a cooling airflow across the system. (See **Section 1.2.8**)

1.1.2.6 Backplane Board

An internal backplane board separates the front and rear sections of the enclosure. The backplane consists of traces for logic level signals and low voltage power paths. It contains no user-serviceable components.



WARNING!

When inserting a removable module, **DO NOT USE EXCESSIVE FORCE!** Forcing or slamming a module can damage the pins on the module connectors either on the module itself or on the backplane. Gently push the module until it reaches the end of module slot. Feel the contact resistance and use slightly more

pressure to ensure the module connectors are correctly mated. If the module comes with ejection levers or retention screws, use them to secure the module.

1.2 System Components

The S16E is designed with modular components for ease of maintenance. Hot-swap mechanisms are incorporated to eliminate power surges and signal glitches that might occur while removing or installing these modules.

1.2.1 Drive Trays

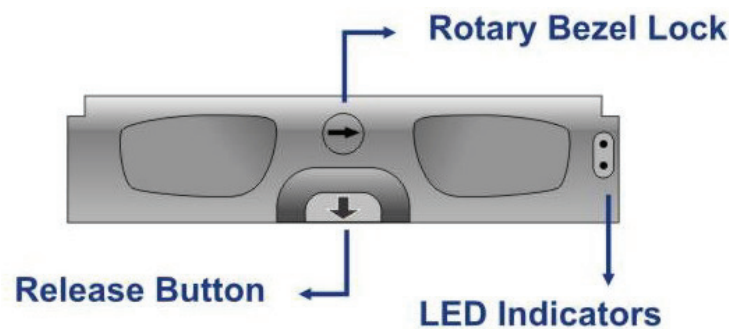


Figure 1-6: Drive Tray Front View

PN: IFT-9273CDTray

The sixteen (16) drive trays accommodate separately purchased, standard 1-inch pitch, 3.5-inch SAS or SATA-II disk drives. The drive bays are located in the front section of the chassis. Two (2) LEDs on the front bezel indicate the operating statuses of individual disk drives. A rotary bezel lock on the front bezel secures the hard drive in place, while a release button is used to open the front bezel.



WARNING!

Be careful not to warp, twist, or contort the drive tray in any way (e.g., by dropping it or resting heavy objects on it). If the drive bay superstructure is deformed or altered, the drive trays may not fit into the drive bays.

1.2.2 MUX Kit

Unlike the dual-ported SAS drives, using the single-port SATA-II disk drives in a redundant-controller system (S16E-R1240) requires a MUX board.

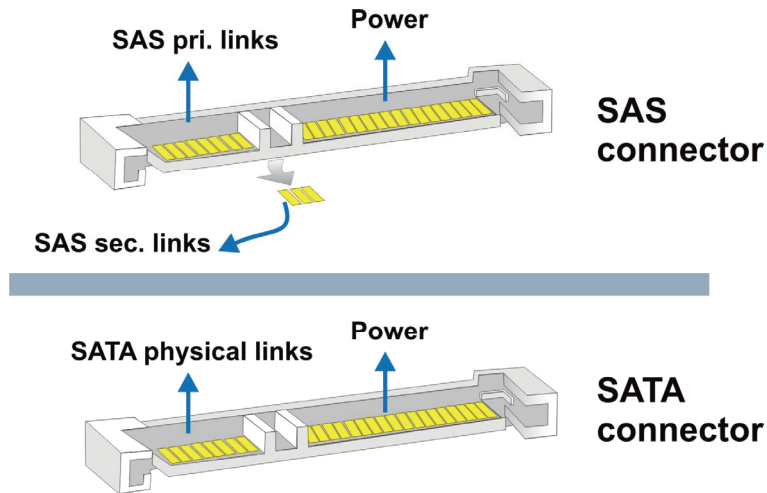


Figure 1-7: Comparison between Dual-ported SAS and Single-port SATA Connectors

The MUX board provides port selector circuits for access from partner RAID controllers to each individual disk drive. See the drawing below for how it works.

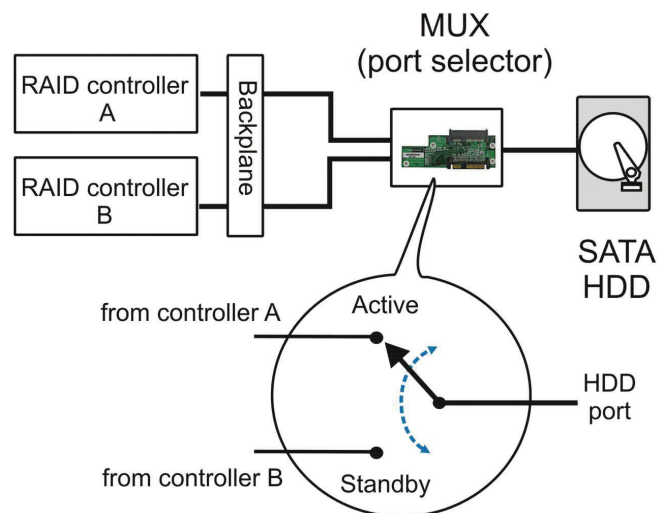


Figure 1-8: MUX Kit Working Theory

If SAS drives are preferred, these MUX boards will be unnecessary and must be manually removed from the drive trays by loosening retention screws from it.

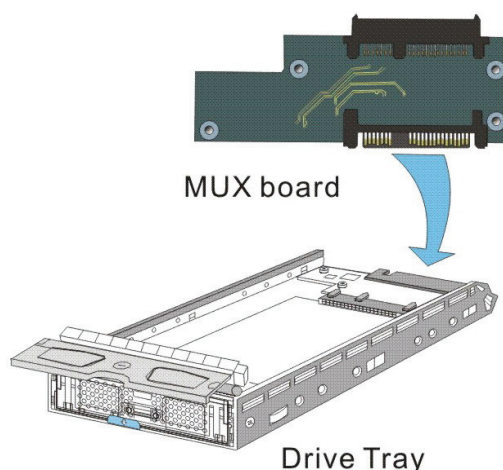


Figure 1-9: MUX Kit

1.2.3 The RAID Controller Module

PN:	IFT-83SE12RF16 x 2 (without cache memory)	S16E-R1240
	IFT-83SE12RF16MA (with 1GB cache)	
	IFT-83SE12GF16 x 1 (without cache memory)	S16E-G1240
	IFT-83SE12GF16MA x 1 (with 1GB cache)	

The default size for the DDR-II DIMM module on RAID controllers is 1GB. A RAID controller module contains a main circuit board, a preinstalled 1GB memory, battery charger circuitry, a daughter board with host port interfaces, and a flash SSD. The controller module contains no user-serviceable components. Except when servicing the cache memory or the CBM module within, the controller module should never be removed or opened.



WARNING!

Although the RAID controller can be removed, the only time you should touch the controller itself is to install the memory modules. The RAID controller is built of sensitive components and unnecessary tampering can damage the controller.

The docking connector at the rear of the controller board connects the controller module to the backplane board.

1.2.4 Controller Module Interfaces

All external interfaces that connect to external devices are located on the controller module's rear-facing faceplate. The interfaces are listed below.

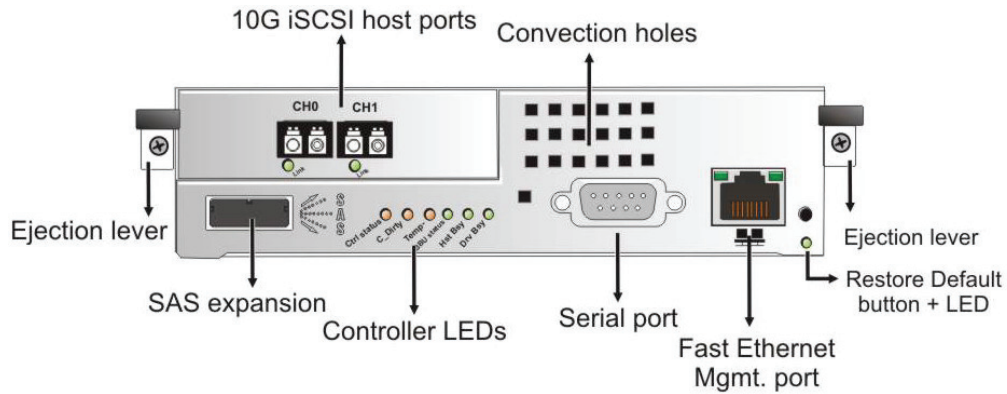


Figure 1-10: Controller Module Interfaces

- **Host ports:** Two (2) 10G Ethernet host ports (indicated as CH0 and CH1). These ports receive multi-mode, IEEE 802.3ae 10GBASE-SR, SFP+ multi-mode transceivers and then to short-wavelength optical cables.
- **Serial port:** The controller module comes with one (1) COM ports. The serial ports are used for local access to the firmware-embedded configuration utility using terminal emulation program.
- **LED indicators:** Six (6) LED indicators illustrate the system's key operating statuses. Please see **Chapter 4** for more information.
- **Ejection Levers:** Two (2) ejection levers on the sides of the controller ensure that the back-end connectors are properly seated in the module slot and properly mated with the backplane.
- **SAS Expansion Port:** The multi-lane expansion port connects to expansion enclosures (JBOD).
- **Management LAN Port:** A 10/100BaseT Ethernet port connects the system to a network and then to a management computer. Available management interfaces include: telnet, Java-based SANWatch manager, or the web-based "Embedded RAIDWatch" manager invoked by an http console.
- **Restore Default LED and button:** The push button and LED are used to restore firmware defaults in cases when upgrading firmware, upgrading DIMM size, or if an administrator forgets system password. For more details, please refer to **Chapter 3**.

1.2.5 Cache Module

The controller default for the cache module is a 1GB DDR-II module and the allocable size up to 2GB. The memory socket is located on the side of the controller board.

1.2.6 CBM (Cache Backup Module)

PN: IFT-9373CBBU (CBM: IFT-9373CCBM, including flash and BBU)

A Li-Ion battery backup unit (BBU) module (see the diagram below) can support the transfer of cached data from cache memory to an onboard flash during a power outage. The battery module comes with an EEPROM that marks the installation date, and system administrators will be notified when the 3-year life expectancy is reached. The BBU is not hot-swappable.

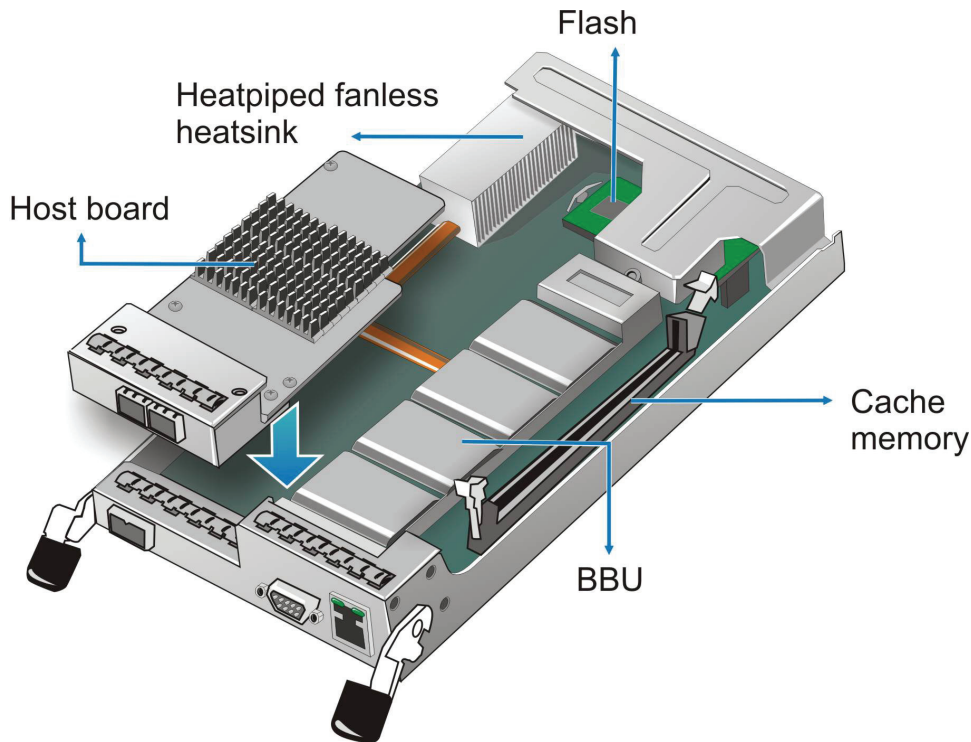


Figure 1-11: Modules within Controller Canister

In accordance with international transportation regulations, the BBU module is only charged to between 35% and 45% of its total capacity when shipped. Therefore, when powering on the system for the first time, the BBU will begin to charge its batteries to its full capacity. It normally requires approximately twelve (12) hours for the battery to be fully charged. If the battery is not fully charged after twelve (12) hours, there may be a problem with the BBU module. You may re-install the battery; and if the battery still shows problems with charging, contact your system vendor for a replacement. While the battery is being charged, the LED on the BBU will start flashing.

You can check battery's charge level using a terminal console with firmware's embedded utility.

1.2.7 Power Supply Units

PN: IFT-9373CPSU

The system is equipped with two (2) redundant, hot-swappable, 530W PSUs, at the rear section of the chassis. The PSU is housed in a 2U canister containing both the Power supply and a cooling module at the end of the canister.



NOTE:

Swapping the PSU also removes the cooling module within.

As shown below, each PSU comes with a power socket and a power switch to turn the system on and off. Two (2) embedded cooling fans provide sufficient airflow. A single LED indicates the PSU status. When a power supply failure occurs, the LED lights red. An extraction handle at the rear of the PSU is designed to help properly install or remove the module.

A screw hole on the extraction handle helps secure a PSU to chassis.

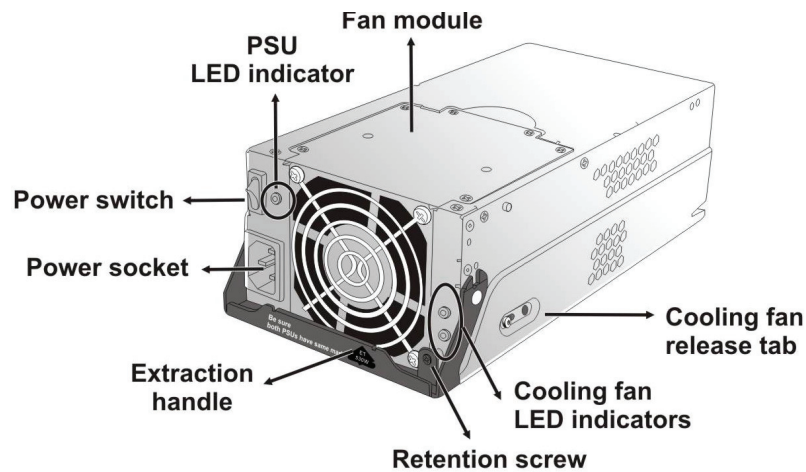


Figure 1-12: PSU Module

Please refer to **Appendix A** for more information of the PSUs.

1.2.8 Cooling Fans

Cooling modules are not hot-replaceable. If a cooling fan fails, replace the whole PSU & cooling combo module.

Two cooling modules are implemented within the rear sections of PSU modules. The cooling fans operate at different fan speeds. When the system operates normally, the cooling fans operate at the lower speed. If a major component fails or when one of the

temperature thresholds is violated, the cooling fans automatically raise its rotation speed.

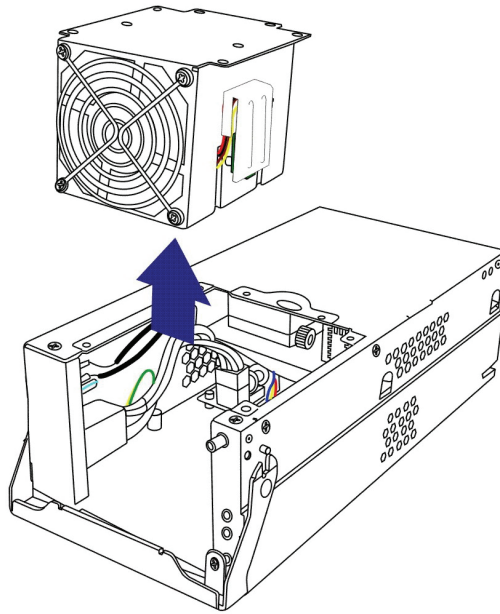


Figure 1-13: Cooling Fans

1.3 System Monitoring

The system comes with a number of different monitoring methods that provide you with continual updates on the operating statuses of the system and individual components. The following monitoring features are included:

1.3.1 I²C bus

The following system elements are interfaced to the RAID controller over a non-user-serviceable I²C bus:

- Power supplies and cooling modules
- Module presence detection circuits
- Temperature sensors (for detecting the temperature on the backplane board and controller board)

1.3.2 LED Indicators

The following components come with LEDs to indicate the operating statuses of individual components:

- LCD keypad panel
- RAID controller

- Cooling modules (2 LEDs on a PSU faceplate)
- PSU modules (1 LED on each module)
- Drive trays (2 LEDs on each tray)

1.3.3 Audible Alarm

The system comes with an audible alarm that is triggered when a component fails or when the pre-configured temperature or voltage thresholds are exceeded. Whenever you hear an audible alarm, it is imperative that you determine the cause and rectify the problem immediately.

Event notification messages indicate the completion configuration tasks, status of components, or fatal errors. Events are always accompanied by two (2) or three (3) successive and prolonged beeps.



WARNING!

When an audible alarm is heard, system administrators should rectify the cause of the alarm as soon as possible.

1.4 Hot-swappable Components

1.4.1 Hot-swap Capabilities

The system comes with a number of hot-swappable components. A hot-swap component is one that can be exchanged while the system is still operating. These components should only be removed from the chassis when they are being replaced. At no other time should these components be removed from the system.

1.4.2 Components

The following components are hot-swappable:

- RAID controller (in a redundant-controller configuration)
- Power supply units (PSUs)
- Hard disk drives

1.4.3 Normalized Airflow

Proper cooling is referred to as “normalized” airflow. Normalized airflow ensures the sufficient cooling within the system and is only

attained when all components are properly installed. Therefore, a failed component should only be removed when a replacement is available. If a failed component is removed but not replaced, airflow will be disrupted and damage to the system can result.

Chapter 2

Hardware Installation

2.1 Introduction

This chapter provides detailed instructions on how to install the system. Installation into a rack or cabinet should occur **before** the hard drives or drive trays are installed into the system. Please confirm that you received all of the components listed on the included **Unpacking List** before proceeding with the installation process.

2.2 Installation Prerequisites

1. **Static-free installation environment:** The EonStor S16E system must be installed in a static-free environment to minimize the possibility of electrostatic discharge (ESD) damage. (See **Section 2.3.2**)
2. **Component check:** Before installing the EonStor S16E system, you should first check to see that you have received all the required components. If any items appear damaged, contact your vendor for a replacement.
3. **Hard drives:** Sixteen (16) 3Gb/s SAS or SATA-II hard drives must be purchased separately prior to installing the system. (See **Section 2.7**)



CAUTION!

Currently only 3Gbps SATA-II disk drives are supported. Make sure you properly configure HDD configuration (such as jumper setting) before you install hard drives into the system. Some hard drives come with a default speed set to 1.5Gbps.

If using hard disks defaulted to 1.5Gbps, compatibility issue may occur.

4. Cabling:

The S16E models come with the following cables;

1. Two (2) **power cords** for connections to the power sources. Cable type is determined by the shipped-to area.

Other cables are user-supplied:

1. **Host link cables:** Use SFP+ multi-mode, short-wavelength optical transceivers (An Avago's transceiver or those other vendors and optical cables are included in the accessory list) and LC type, short-wavelength optical fiber cables to connect the host ports. See **Chapter 3** for cabling topologies.
2. A serial cable for connecting a terminal station (for the single controller G1240).
3. One (1) or two (2) Ethernet cables to the 10/100BaseT **management port**.
5. Mixing SAS and SATA drives in the same enclosure is allowed. However, please DO NOT mix SAS and SATA-II drives in the same drive column.
6. **DO NOT** place a column of SATA-II disk drives between two columns of SAS disk drives. With a higher rotation speed, SAS disk drives on the flanks of SATA-II disk drives will eventually cause a stability issue.

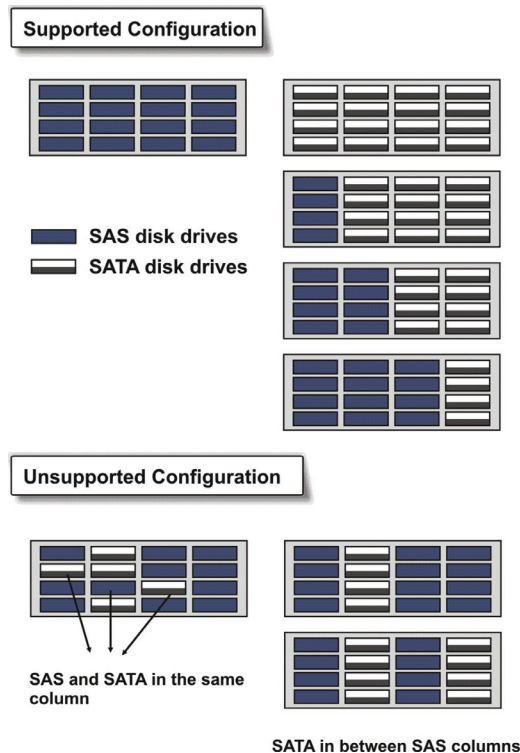


Figure 2-1: Supported and Unsupported Drive Configurations

7. **Hard drives:** Up to sixteen (16) SAS or SATA-II hard drives must be purchased separately and hard drives should be available prior to installing the enclosure. (See **Section 2.7**)

2.3 Safety Precautions

2.3.1 Precautions and Instructions

1. **Static-free installation environment:** The enclosure must be installed in a static-free environment to minimize the possibility of electrostatic discharge (ESD) damage.
2. **Component check:** Before installing the enclosure, check to see that you have received all the required components. If any items appear damaged, contact your vendor for a replacement.
3. **Rack installation:** The enclosure chassis can be installed into a rack cabinet using separately purchased mounting rails, rear-attached brackets, or Infortrend's **IFT-9373CSlider36** rackmount rails.
4. Disconnect the power cords if the need should arise for cleaning the chassis. Do not use liquid or sprayed detergent for cleaning. Use a lightly moistened cloth for cleaning.
5. Be sure the correct power range (100-120 or 220-240VAC) is supplied by the power source at your installation site. It is highly recommended to connect two different power supplies to separate power sources; e.g., one to a power outlet, and the other to a UPS system.
6. Thermal notice: All drive trays (even if they do not contain a hard drive) must be installed into the enclosure. Leaving a drive bay or module slot open will severely affect the airflow efficiency within the enclosure, and will consequently lead to system overheating. Keep a faulty module in place until you have a replacement unit and you are ready to replace it.
7. Rack-mounting: The system is intended to be rack-mounted. Following concerns should be heeded when mounting the enclosure into a rack cabinet:
 - a. An enclosure without disk drives can weigh over 16 kilograms. Two (2) people are required to install or relocate the system. Drives should be removed from the enclosure before moving the system.

- b. The system is designed to operate in an environment where the ambient temperature around the chassis must not exceed 35°C.
 - c. The openings on the enclosure are for air circulation and hence ventilation openings should never be obstructed.
 - d. Proper grounding, over-current protection, and stability features should be provided with the rack cabinet into which the system is mounted.
- 8. Operate the system in an environment with least humidity.
 - 9. Lay the system on a reliable surface when servicing individual modules. A drop or fall can cause injury.
 - 10. Make sure the voltage of the power source is within the rated values before connecting the system to the power source. You may also refer to **Appendix A** of this manual for technical details.
 - 11. Airflow considerations: The system requires an airflow clearance especially on the front and the rear sides. For proper ventilation, a minimum of 2.5cm is required between the front of the enclosure and rack cover; a minimum of **18 to 20cm** is required on the rear side.

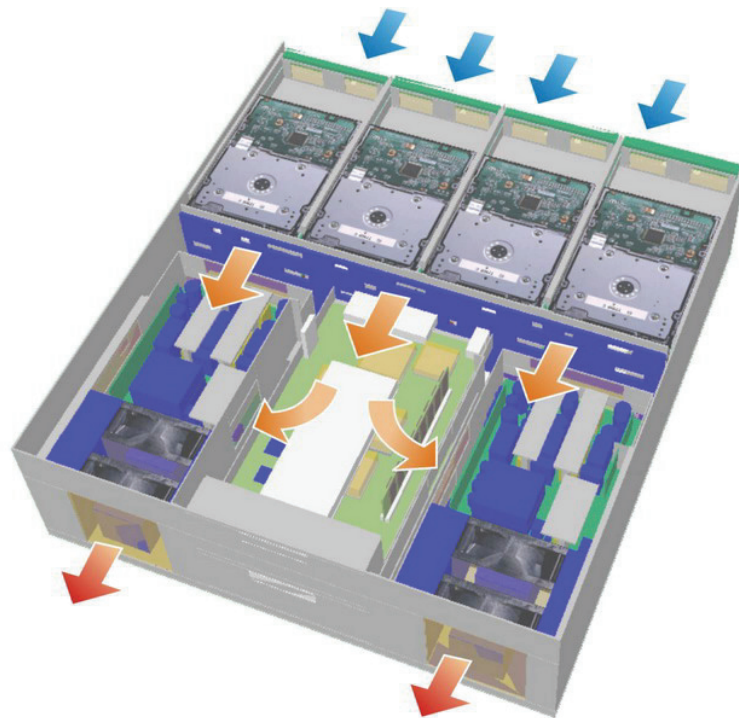


Figure 2-2: Airflow Direction

12. Do not cover the convection holes on controller faceplate. They provide passages for air circulation, and also a glimpse of the 7-seg LED for debug purposes.

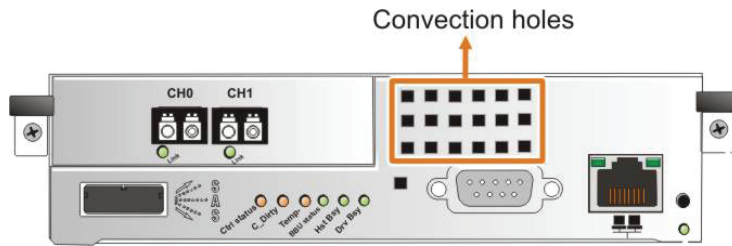


Figure 2-3: Controller Convection Holes

13. Handle the system modules by the retention screws, ejection levers, or the modules' metal frames/faceplates only. Avoid touching PCB boards and connector pins.
14. None of the covers or replaceable modules should be removed in order to maintain compliance with safety, emission, or thermal requirements.
15. If the system is going to be left unused for a long time, disconnect the system from mains to avoid damages by transient over-voltage.
16. Never pour any liquid into ventilation openings; this could cause fire or electrical shock.
17. Never open the system top cover. For safety reasons, only qualified service personnel could access the interior of the chassis.
18. Always secure every enclosure module by its retaining screws or make sure it is held in place by its latches or hand screws.
19. Always make sure the system has a safe electrical earth connection via power cords to the power source sockets at the installation site.
20. Be sure that the rack cabinet into which the system chassis is to be installed provides sufficient ventilation channels and airflow circulation around the chassis.
21. Provide a soft, clean surface to place your enclosure on before working on it. Servicing the enclosure on a rough surface may damage the finish of the chassis.
22. If it is necessary to transport the system, repackage all disk drives separately.

23. If one of the following situations arises, get the enclosure checked by service personnel:

- a. Any of the power cords or plugs is damaged.
- b. Liquid has penetrated into the system.
- c. The enclosure has been exposed to moisture.
- d. The system does not work well or you cannot get it work according to this manual.
- e. The system has dropped and been damaged.
- f. The system shows obvious signs of breakage.

2.3.2 Static-free Installation

Static electricity can damage the system's electronic components. To prevent ESD damage to any of the components, follow these precautions before touching or handling them:

- Discharge the static electricity accumulated in your body by wearing an anti-static wristband.
- Use antistatic strap during handling. Connect the equipment end of the strap to an unfinished chassis surface.
- Avoid carpets, plastic, vinyl, and styrofoam in your work area.
- If the need should arise for carrying system modules from one place to another, carry them in a static shielding container.
- Avoid the contact between circuit boards and clothing.
- Handle all components by holding their edges or metal frames. Avoid touching the exposed circuitry on PCB boards and connector pins.

2.4 General Procedure

- | | |
|----------------|--|
| Step 1. | Unpack: Unpack the system and confirm that all the components on the Unpacking Checklist have been included. |
| Step 2. | Install a CBM module if CBM has been separately purchased for a single-controller G model. |

- Step 3.** Install RAID controller into chassis. (See **Section 2.7**)
- Step 4.** **Rack/Cabinet installation:** Installing the system into a rack or cabinet requires at least two (2) people. (See **Section 2.6**)
- Step 5.** **Install hard drives:** Secure SAS/SATA-II hard drives within the drive trays.
- Step 6.** **Install drive trays:** After the hard drives have been secured in the drive trays, install them into the enclosure. (See **Section 2.9**)
- Step 7.** **Cable connection:** Connect power cords, FC host links, serial port, and Ethernet cables.
- Step 8.** **Power up:** Once the components have been properly installed and all cables are properly connected, you can power up the system and configure the RAID array.

Installation Procedure Flowchart

Figure 2-4 shows a flowchart of the installation procedure. As you complete each step, check off the “**Done**” box on the right. Please use this flowchart in conjunction with the instructions that follow.

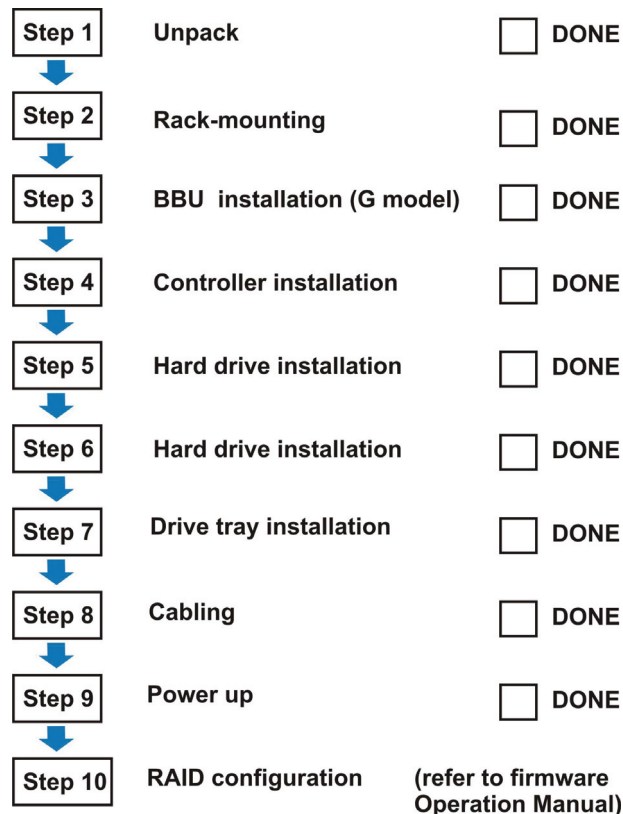


Figure 2-4: Installation Procedure Flowchart

2.5 Unpacking the System

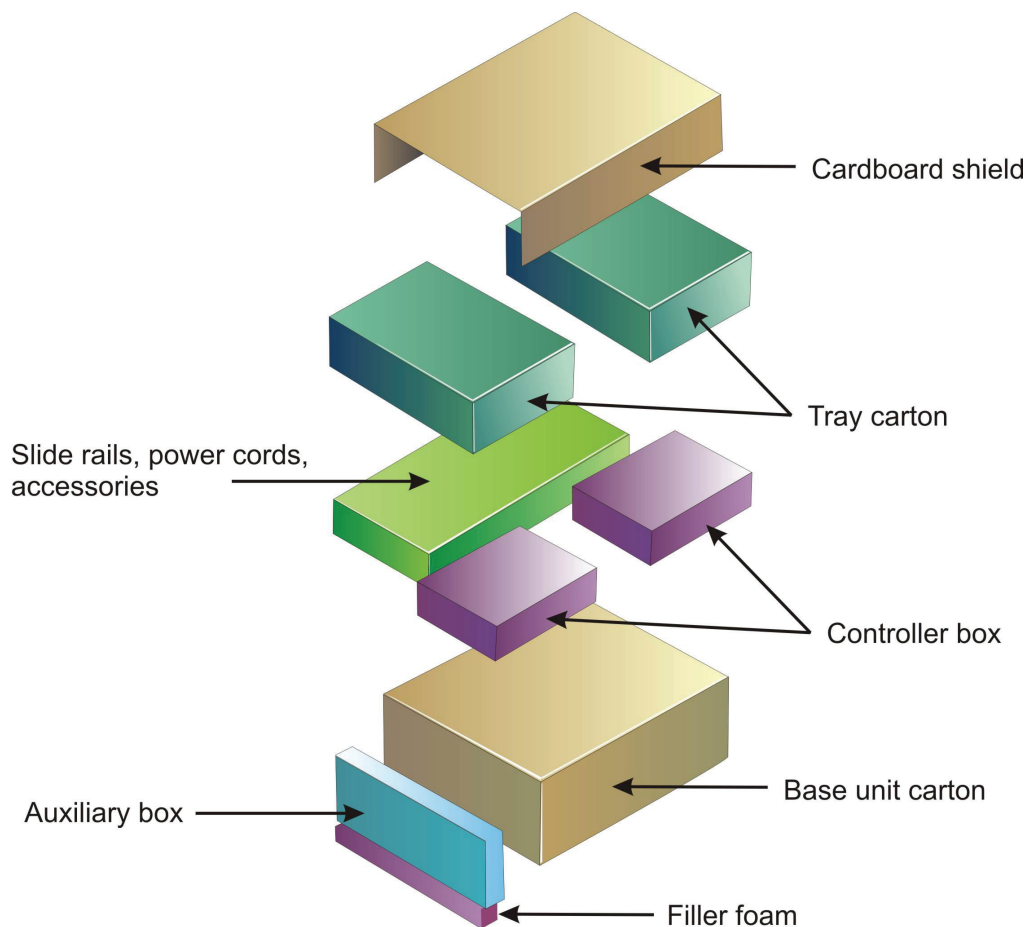
Use the **Unpacking Checklist** in your package to verify package contents. Carefully check the items contained in each box before proceeding with installation.



NOTE:

A detailed unpacking list can be found in your product shipping package or product CD.

The package contents are shown below:



1. Two power cords.
2. A printed copy of **Quick Installation Guide**.
3. Screws for rack-mounting and securing disk drives.
4. A product utility CD containing the **Installation and Hardware Reference Manual** (this document), the **Operation Manual** (firmware), the SANWatch programs and **SANWatch User's Manual**, and other related documentation.
5. If ordered, rackmount rails will be included.

6. If additional power cords or host link cables have been included in a purchase order, they will be shipped in the auxiliary box.

2.5.1 Preinstalled Components

The following components have been installed at the factory and do not need to be installed:

- 1 - Backplane board
- 1 - DDR-II DIMM module (in each controller module)
- 2 - PSU modules
- 2 - CBM modules (for redundant-controller model)
- 1 - LCD keypad panel
- 2 - Cooling fan modules (within PSU canisters)

2.5.2 Components to be Installed

You must install the following components:

- Rackmount rails (if purchased)
- RAID controllers
- CBM (separately purchased for the G model)
- Hard drives (separately purchased SAS or SATA-II disk drives)
- Drive trays
- Cables

2.6 Rack/Cabinet Installation

PN: IFT-9373CSlide36 - for 24" to 36" deep rack

The system is designed to fit into a variety of 19-inch rack cabinets or racks. Make sure you have an appropriate site location and cables prepared with adequate lengths to connect to power source and other devices.

When installing the system into a rack or cabinet it is advisable that another person assists you in the mounting process.

Package Contents

The rackmount rail kit should include the following components:

Item	Description	Quantity
01	Mounting bracket assembly, L-shape, left-side	1
02	Mounting bracket assembly, L-shape, right-side	1
03	Inner glide	2
04	Flange filler plate (fixed behind chassis ears)	2
05	Cross recess truss head screws M5 L8 x 9.0mm	8
06	#6-32 x10mm flathead screws	4
07	#6-32 L6 flathead screws	6
08	M5 cage nuts	4



NOTE:

Screws for securing chassis to the front rack posts are provided in the system's **accessory box**. There are 4 M5 x35mm, 4 M6 x35mm, and 4 #10-32 31.75mm screws.

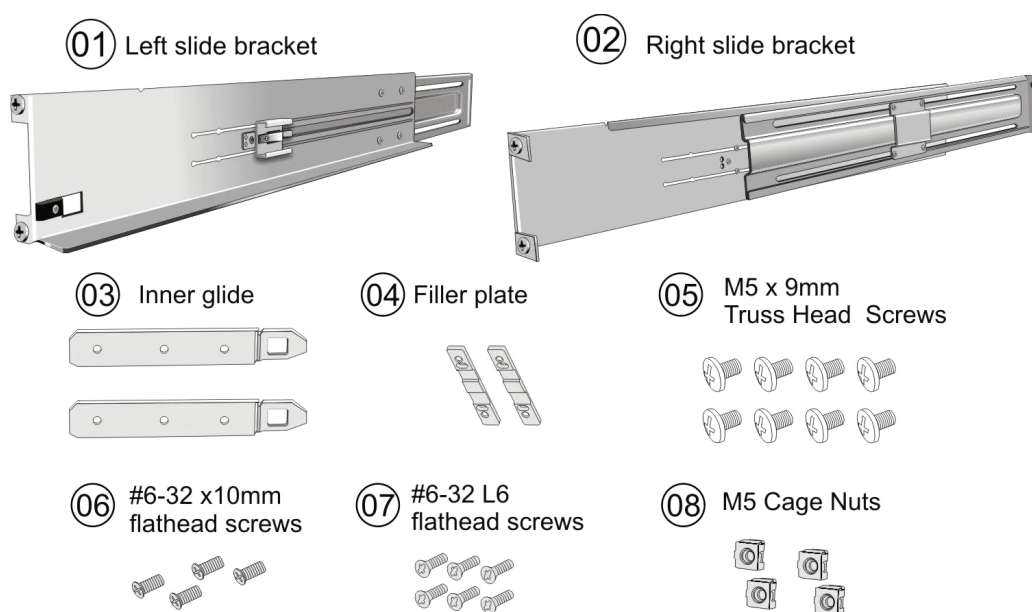


Figure 2-5: Rackmount Rail Components

Installation Pre-requisites

- 1 medium-size cross-head screwdriver.
- 1 medium-size flat-head screwdriver.
- 1 small-size (1/8") flat-head screwdriver
- 2 people are required to rack-mount the enclosure.



CAUTION!

The hard drives and drive trays should only be installed into the system after the system has been mounted into a rack cabinet. If the hard drives are installed first, the system will be too heavy to handle and the possible impact during installation may damage your drives.

Rack-mounting Steps

Step 1. Determine where in the rack, the system is going to be installed by referring to the rack post drawing below.



CAUTION!

The mounting positions must be carefully measures so that rails can be mounted parallel to each other.

Step 2. Use the figures below to measure the relative locations of the cage nuts on the rack posts (if they do not have threaded holes). Attach two M5 cage nuts (#08) on each of the front rack posts.

On Front Rack Posts:

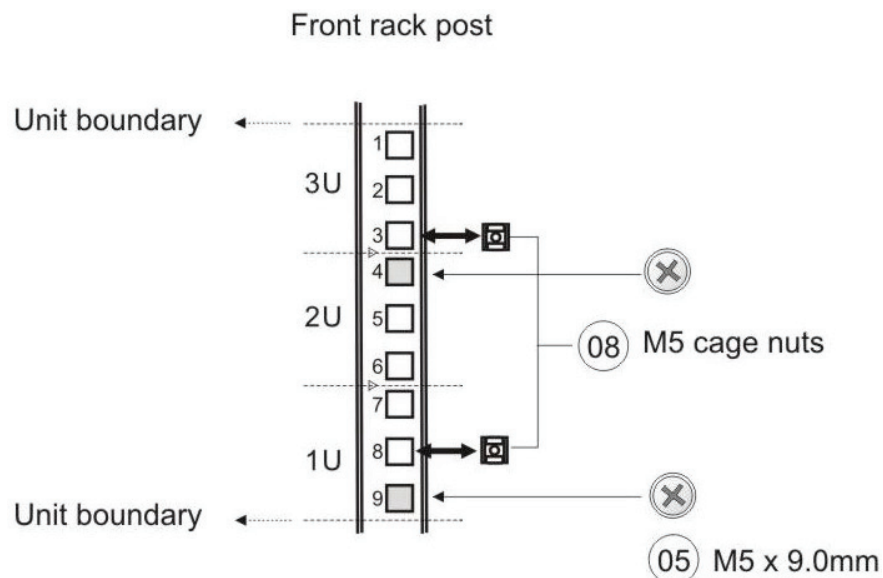
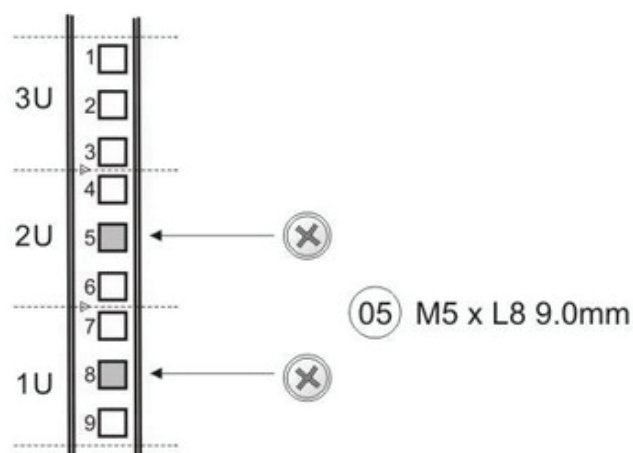


Figure 2-6: Rack-mount Positions & Cage Nut Positions on a Front Rack Post

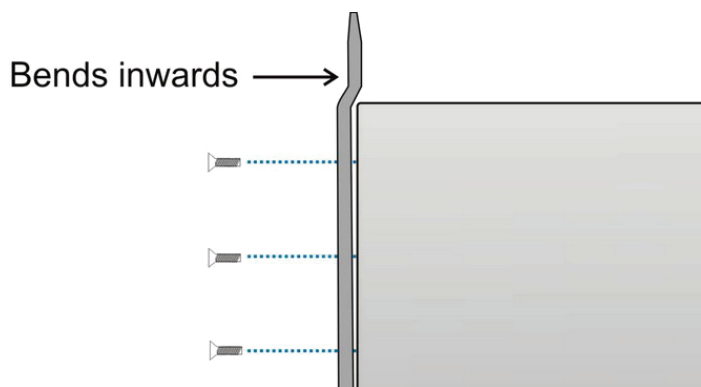
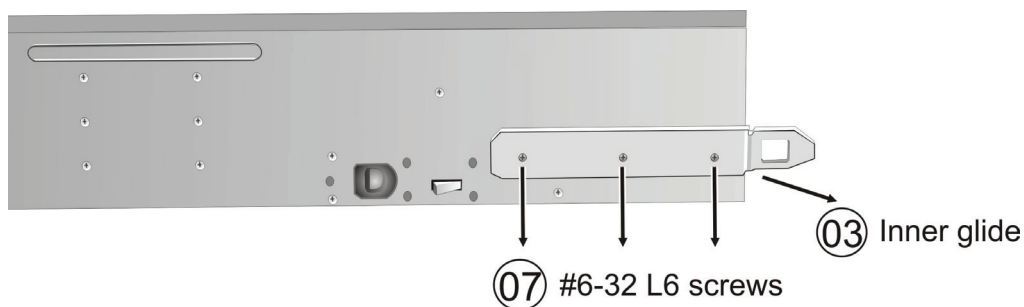
On Rear Rack Posts:

Rear rack post

**Figure 2-7: Mounting Holes on a Rear Rack Post****Step 3.**

Attach inner glides to the sides of chassis using the included screws.

When attaching the inner glides, orient them so that the slimmer part of the glides has a bend towards the center of chassis. If installed in a wrong orientation, you will not be able to install the chassis into rack.

**Figure 2-8: Inner Glide Orientation: Top View****Figure 2-9: Attaching an Inner Glide**

- Step 4.** Adjust the length of the rail assembly and make sure the bend of the L-shape rail (#01) faces inward. Loosen the four screws near the end of the L-shape bracket to adjust rail length. Fasten them when length adjustment is done.

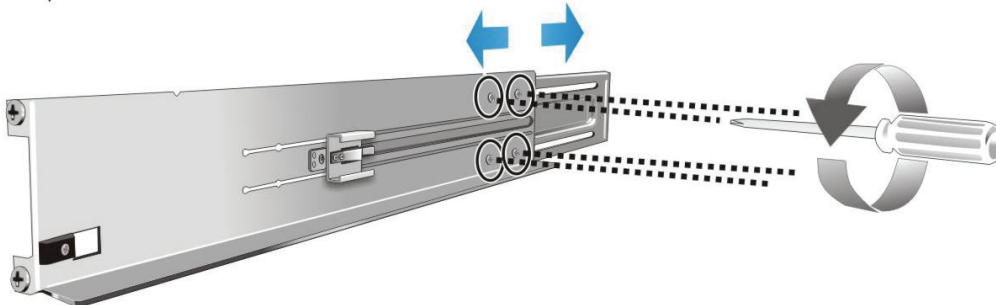


Figure 2-10: Adjust the Rail Length

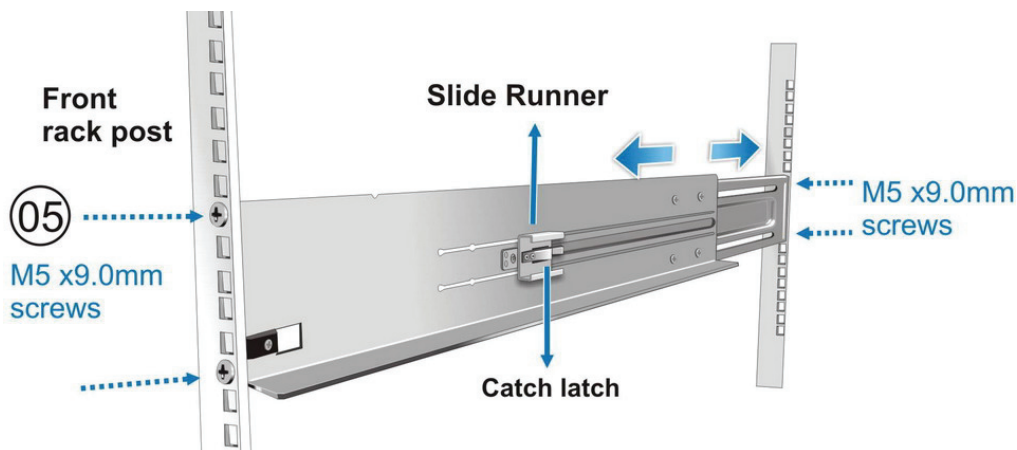


Figure 2-11: Fitting the Rail into Rack

- Step 5.** Position the front-end of a rail below the top cage nut. Secure the rail to the front and rear rack posts each using two M5 screws (#05). (See figure above) Do not insert the screws into the cage nuts because these cage nuts will be used to secure the enclosure to rack later.
- Step 6.** Attach the filler plates (#04) behind the enclosure ears using the four #6-32 x 10mm flat head screws (#06) on each side.

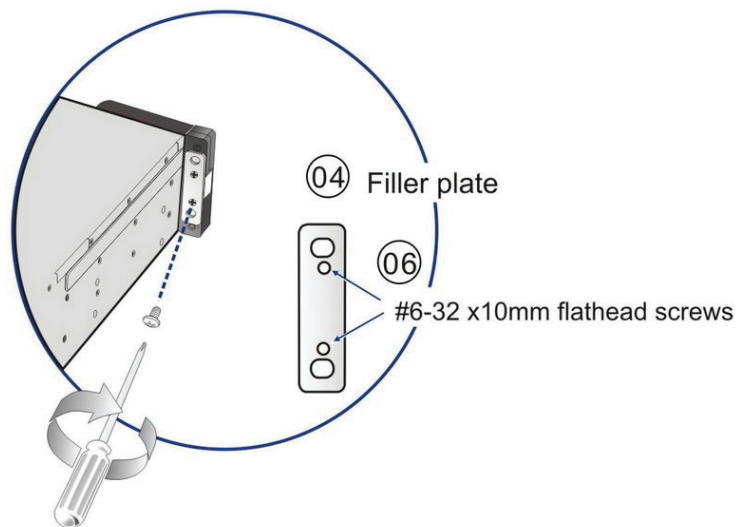


Figure 2-12: Securing a Filler Plate behind Chassis Ears

Step 7.

Place the enclosure onto the rails and slide the enclosure into rack until its chassis ears flush with the front rack posts. Two people are required.

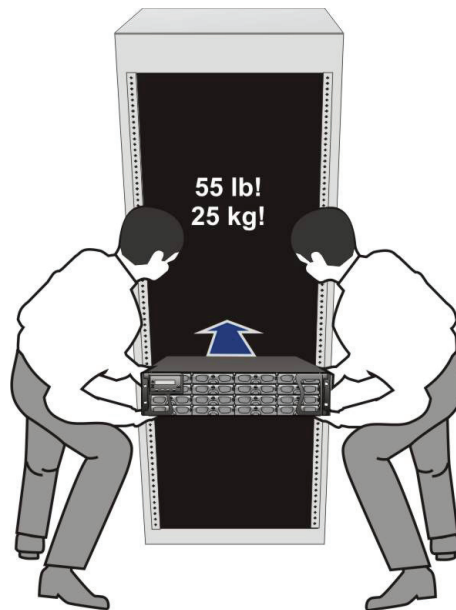


Figure 2-13: Mounting the Enclosure

While pushing the chassis into rack, make sure the tips of inner glides fit into brackets on the slide runners. A “click” sound will be heard when the inner glides catch the spring latches on the slide runners.

Step 8.

Fasten four screws provided in your accessory box (M5, M6, or #10-32) through mounting holes on the chassis ears.

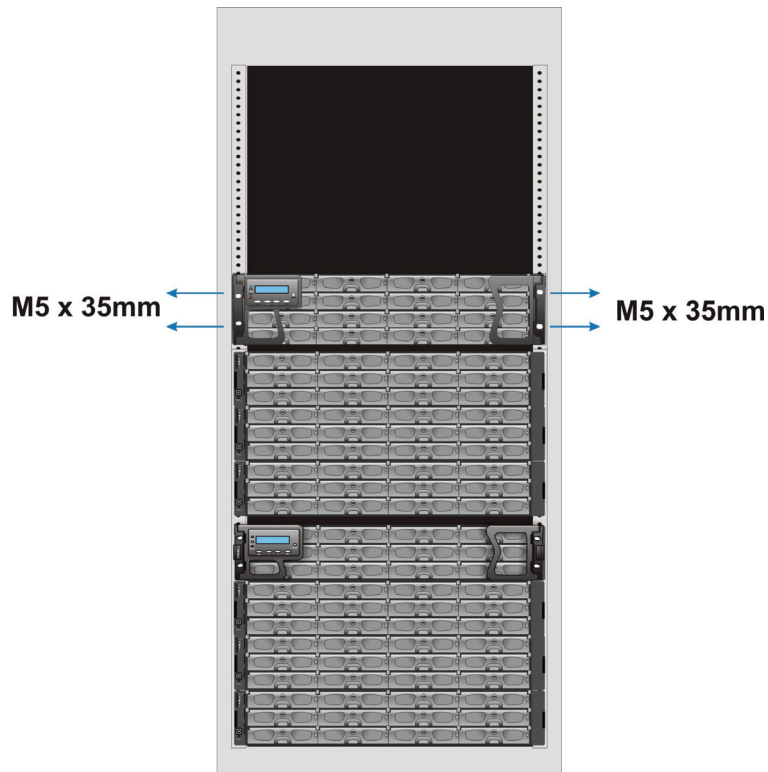


Figure 2-14: Securing Enclosure to Rack

Removing Chassis

If you need to remove a chassis from rack:

- Step 1.** Remove the screws fastened through the chassis ears.
- Step 2.** Pull the chassis out until it is stopped by the retention latches.
- Step 3.** Use both hands to support the weight of the chassis, and then use your index fingers to press and pull the release latches towards you.

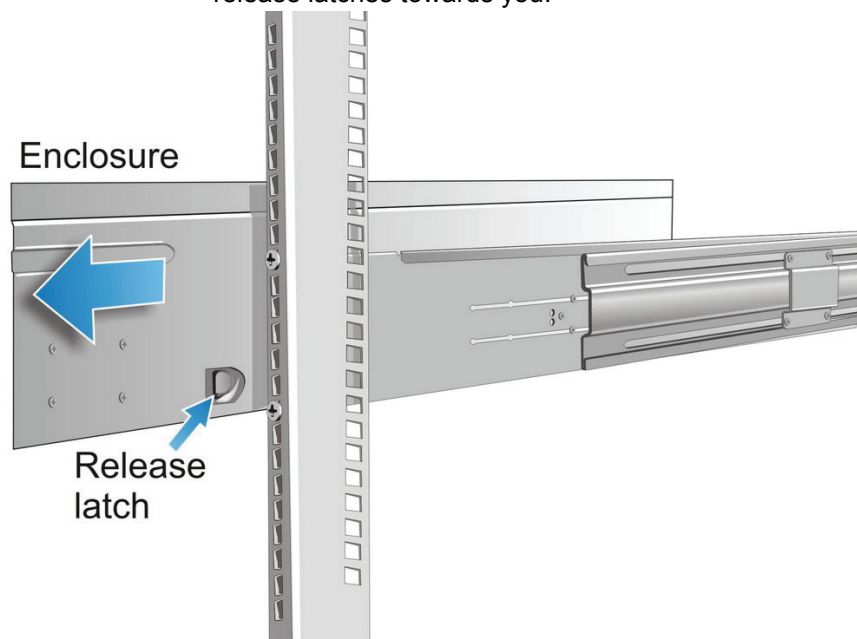


Figure 2-15: Removing Chassis from Rack

- Step 4.** When the chassis is released, slowly pull the chassis from rack. Another person should be helping you to remove chassis from rack.

2.7 Controller Installation

2.7.1 Installing a Controller Module



NOTE:

If you have a separately purchased CBM, install it before you install the controllers. For details, see the last section of this chapter.

- Step 1.** **Wear an anti-static wrist strap.** When handling the controller, avoid touching circuit boards and connector pins.
- Step 2.** **Remove controllers from the controller boxes.**
- Step 3.** Align the controller module with the controller module bay, making sure that the levers are down. Gently slide the controller module in.

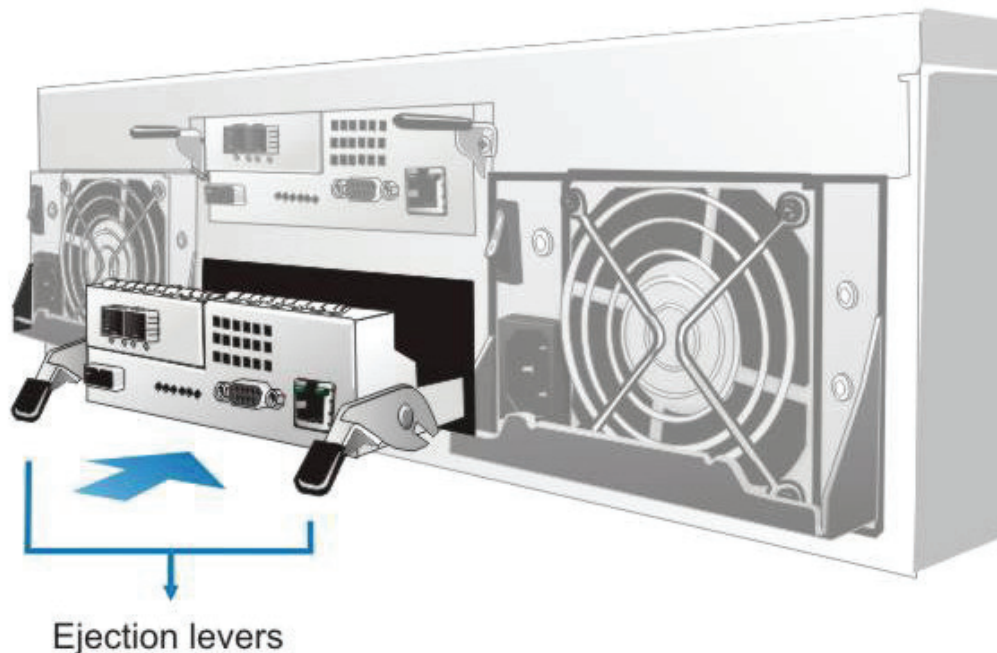


Figure 2-16: Inserting a Controller into Chassis

- Step 4.** **Secure the connection.** When the controller is reaching the end and you feel the contact resistance, use slightly more force to mate the controller with backplane connectors. When the controller is almost

fully inserted, use the ejection levers to secure the controller. The levers help ensure that the back-end connectors are properly mated.

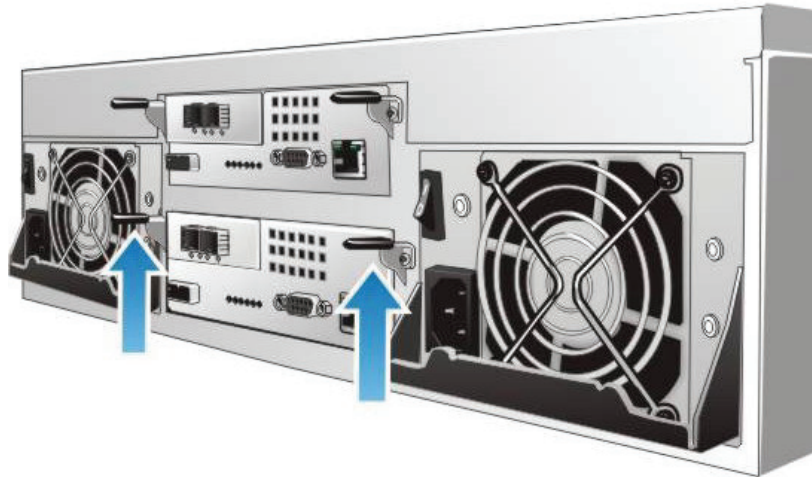


Figure 2-17: Using Ejection Levers to Secure Controller

Step 5. **Fasten the retention screws.** Once fully inserted, secure the controller module to chassis by fastening the retention screws through the holes underneath the ejection lever.

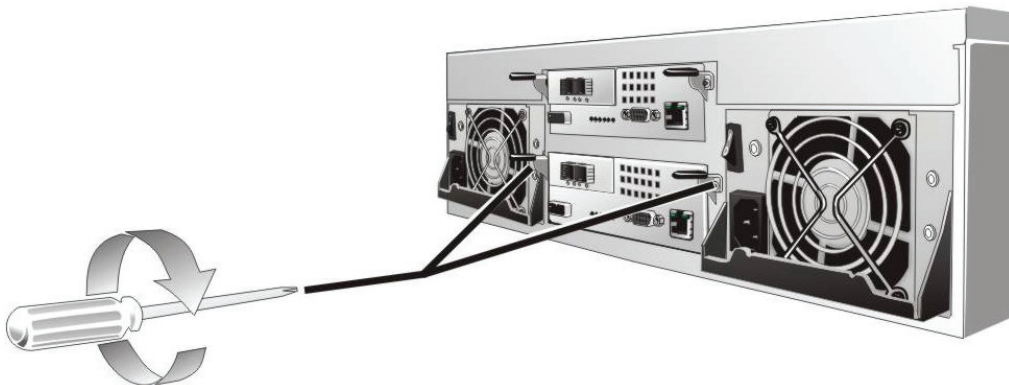


Figure 2-18: Securing Retention Screws

Step 6. **Repeat this process if you have redundant RAID controllers.** Continue with installing cabling and other components.

2.8 Hard Drive Installation

2.8.1 Hard Drive Installation Prerequisites

Hard drives for the EonStor system must be purchased separately. Before installing hard drives, the following factors should be considered:

Capacity (MB/GB): Use drives with the same capacity. RAID systems use a “least-common-denominator” approach. The maximum capacity of each drive used in the array is the maximum capacity of the smallest drive. Choose big drives with the same storage capacity.

Profile: The drive trays and bays of the system are designed for 3.5-inch-wide x 1-inch-high hard drives.

Drive type: This model accommodates SAS or SATA-II (3Gbps) hard drives.

MUX Board: MUX boards are required if using SATA drives in a redundant-controller configuration both in RAID and the expansion enclosures. The S16E-R1240 comes with MUX boards in its drive trays as the default configuration.



WARNING!

1. Handle hard drives with extreme care. Hard drives are very delicate. Dropping a drive against a hard surface (even from a short distance) and hitting or touching the circuit board on the drives with your tools may cause damage to the drives.
 2. Observe all ESD prevention methods when installing drives.
 3. Only use screws supplied with the drive canisters. Longer screws can damage the hard drives.
-

2.8.2 Drive Installation

Step 1. **Place the hard drive into the drive tray** (as shown below), making sure that the interface connector is facing the open side of the drive tray, and the label side facing up.

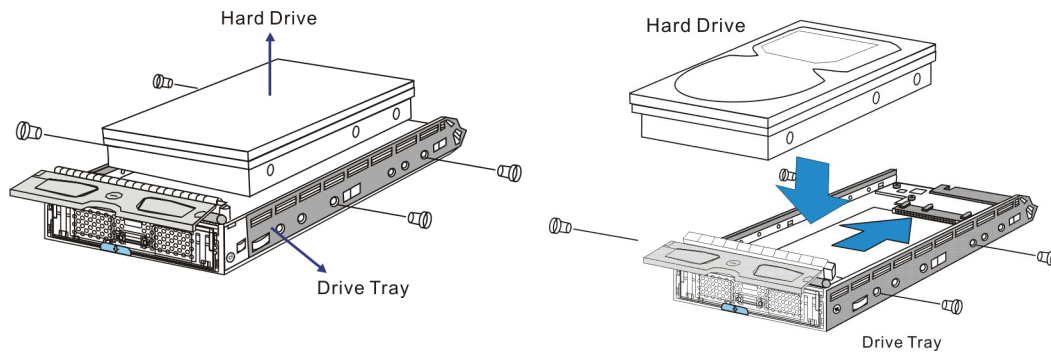


Figure 2-19: Installing a Hard Drive

- Step 2.** **Adjust the drive's location** until the mounting holes in the drive canister are aligned with those on the hard drive. Screws holes used for the installation with or without a MUX board are different.

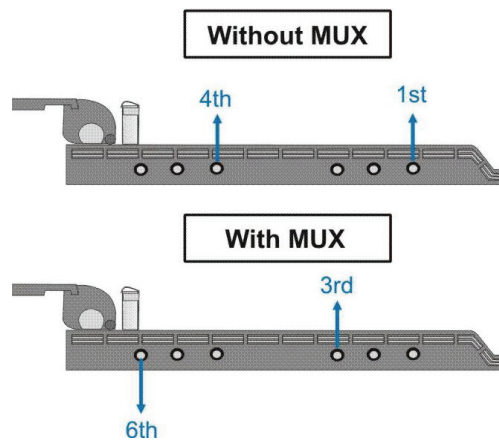


Figure 2-20: Drive Mounting Holes with and without the MUX Board

- Step 3.** Secure the disk drive with four (4) of the supplied 6/32 flat-head screws.
- Step 4.** Once the hard drives are installed into drive trays, install all drive trays into the enclosure. See detailed instructions in the following section.

2.9 Drive Tray Installation

Once the hard drives have been secured within the drive trays, the drive trays can be installed into the system.



WARNING!

All drive trays must be installed into the enclosure even if they do not contain a hard drive. If there are empty drive bays, the ventilation airflow will be disrupted and the system will overheat.

- Step 1.** Use a small-size flat-blade screwdriver to turn **the rotary bezel lock to the unlocked position**, i.e., the groove on its face is in a horizontal orientation.

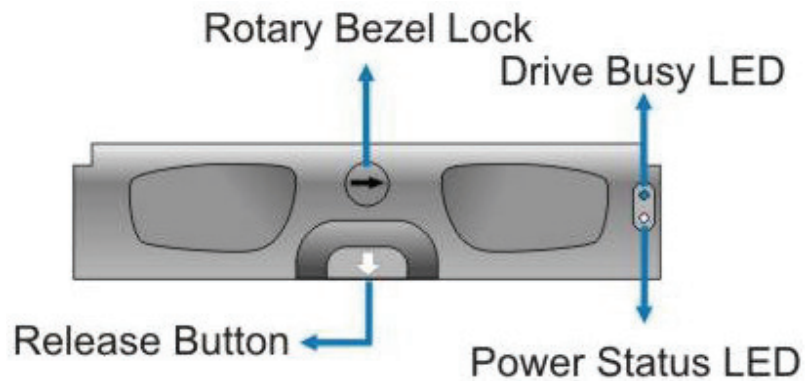


Figure 2-21: Drive Tray Front Bezel

- Step 2.** **Open the front bezel on the drive tray.** Push the release button on the drive tray. The front bezel will spring open.

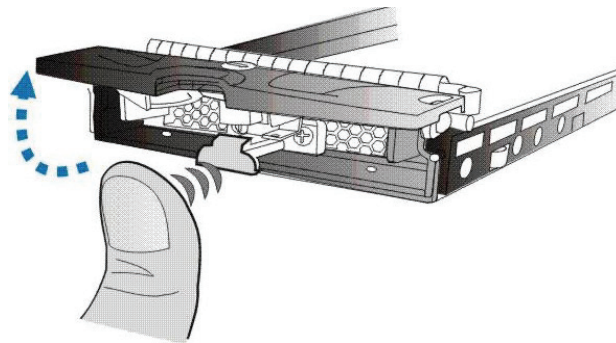


Figure 2-22: Drive Tray Release Button

- Step 3.** **Align the drive tray with a drive bay.** Gently slide it in until the drive tray reach the end of drive bay. This should be done smoothly and gently.

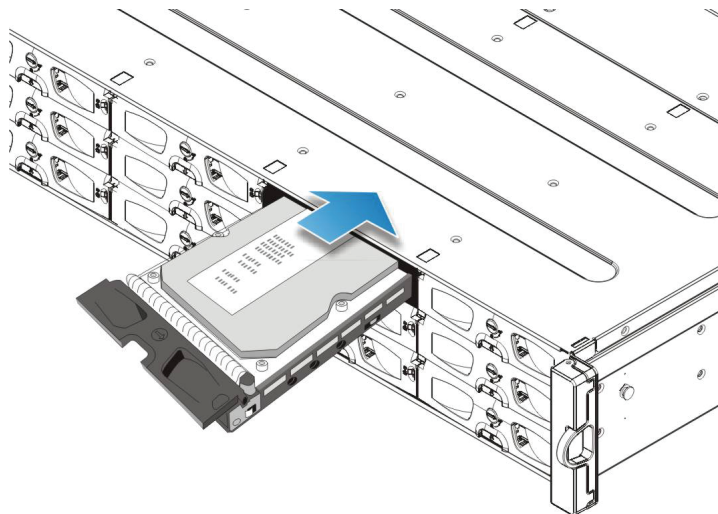


Figure 2-23: Installing a Drive Tray

- Step 4.** **Close the front bezel.** Make sure the front bezel is closed properly to ensure that the back-end connector is properly mated with the corresponding connector on the backplane. If the front bezel can not be closed properly, the connection between the hard drive and the system may come loose and mysterious drive signals may result.
- Step 5.** **Lock the bezel into place** by turning the bezel lock using a 1/8" flathead screwdriver until the groove on its face is pointing down (vertical orientation).

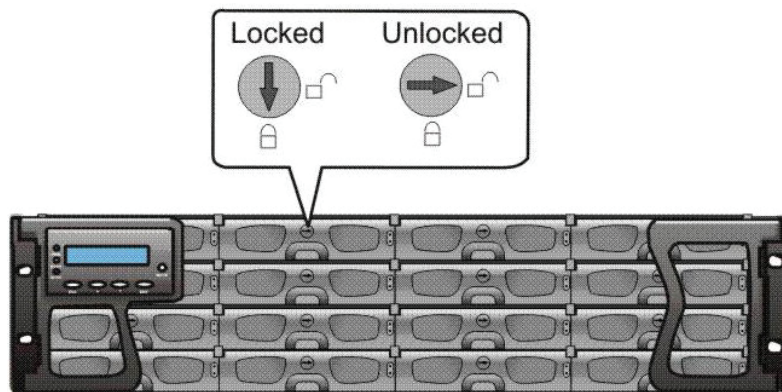


Figure 2-24: Front Bezel Rotary Lock

- Step 6.** Once the drive bays are populated and the system powered on, the RAID controller will automatically spin up the hard drives and recognize their presence.

2.10 Installing CBM (Optional for G Model)

CBM (Cache Backup Module) is an optional equipment for the single-controller S16E-G1240. You need to install CBM on the arrival of your system.

A CBM module contains a battery cell module, and a flash SSD module.

To install a CBM module (Skip steps 1-1~4 if installing CBM at the initial installation):

- Step 1.** 1-1. If a system is powered on, stop host I/Os.
 1-2. Use the "Shutdown Controller" command to flush cached data.
 1-3. Power down the system.

NOTE: If installing a new system, simply remove a RAID controller from its package box. You may then skip steps 1-1 to 1-4.

- Step 2. Remove a RAID controller from chassis by loosening screws under the ejection levers.

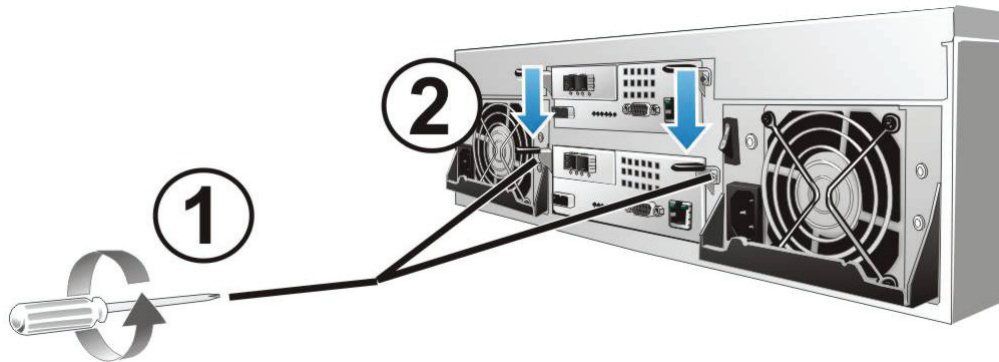


Figure 2-25: Removing a RAID Controller

- Step 3. Press down on the ejection levers. The controller will be eased out from chassis.
- Step 4. Place controller on a clean, static-free surface. Hold the controller by its metal canister. Never touch the circuit board or connector pins.
- Step 5. 5-1. Install BBU by orienting its protruding edge on one end into the insertion slot, and lowering it into the canister. The orientation is shown below.
- 5-2. Carefully orient the BBU so that the golden finger connector on the BBU is properly aligned with that on the charger board.
- 5-3. Once the connectors are mated, fasten the captive screw on BBU to secure the installation.

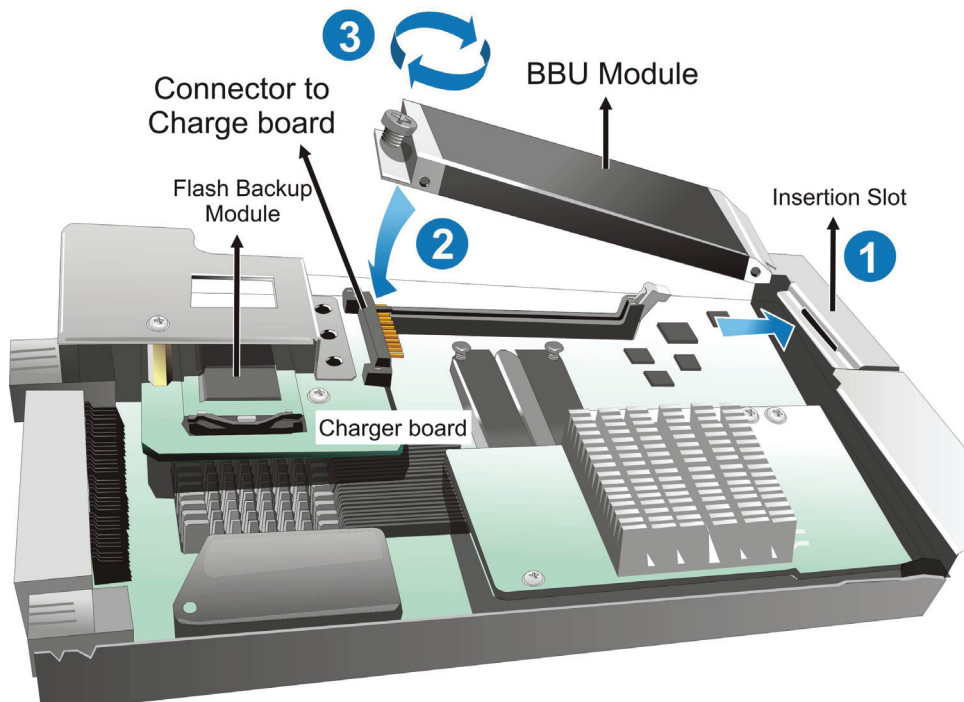


Figure 2-26: Installing BBU Module

- Step 6. 6-1. Install the flash SSD by orienting and inserting it at an approximately 15 degree angle into the SSD

socket. The SSD socket is located on the charger board.

6-2. Make sure the SSD's golden fingers are fully inserted. Press the SSD down. The retention latches on the SSD socket will hold the SSD in place.

Step 7. Install the RAID controller back into chassis. Insert the controller slowly into the module slot. When you feel the contact resistance by your hands, use more force, and then pull both of the ejection levers upwards to secure the controller into chassis.

Step 8. Secure the controller by fastening two screws you previously removed to the screw holes on the ejection levers.

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Chapter 3

System Connection

This chapter outlines some general configuration rules you should follow when cabling a storage system and introduces basic information about cabling and topologies for the S16E system. You can use these topologies or refer to them as a guide for developing your own unique topologies. A complete description of the power on and power off procedures is also given in this chapter.

3.1 Host Connection Prerequisites

3.1.1 Choosing the Host Link Cables

The following transceiver and cables have been tested and certified with your systems. Please contact Infortrend for the latest compatibility list.

IFT-9270CFCCab01	Optical FC cable, LC-LC, MM-62.5/125, Duplex, LSZH, O.D.=1.8mmx2, 1 Meter
IFT-9270CFCCab02	Optical FC cable, LC-LC, MM-62.5/125, Duplex, LSZH, O.D.=1.8mmx2, 5 Meters
IFT-9270CFCCab03	Optical FC cable, LC-LC, MM-62.5/125, Duplex, LSZH, O.D.=1.8mmx2, 10 Meters

The host ports connect to GbE or 10GbE host adapters (HBA) that feature a 1 or 10Gbps transfer rate, SFP+ interface, and support for full-duplex transfer, best come with a 64-bit/133MHz PCI-X or PCI-E interface to ensure enough bandwidth and throughput rate for application servers.

 WARNING!

All optical cables are sensitive and must be handled with care. To prevent interference within a rack system, the cable routing path must be carefully planned and the cables must not be bent.

Lasers

 CAUTION!

Lasers can be hazardous and may cause permanent eye damage or blindness, and therefore must be treated with respect and used with caution. Never look at lasers without confirming that they are off.

Wavelengths: The system supports SFP+ transceivers using lasers on fiber optic cables emitting short wave (SW) beams (770nm-860nm). Cables using either of these wavelengths can be used.

Laser types: Two (2) types of laser devices can be used in optical cables: Optical Fibre Control (OFC) and non-OFC lasers. The OFC lasers are high-powered and can be used over long distances.

Speed Auto-detection

Speed auto-detection is specified by the auto-negotiation mechanism that helps leverage your existing infrastructure. If a GbE port is connected to a 10GE port, it will negotiate down and run at 1Gb/s speed.

SFP+ Transceivers

An SFP+ transceiver converts electrical data signals into light signals and transfers them transparently via optical fiber. A transceiver provides bi-directional data links, a laser transmitter (for fiber optic cables), LC duplex connector, and a metal enclosure to lower the EMI.

Other beneficial features of a typical SFP+ transceiver include a single power supply, low power dissipation, and hot-swap capability. It is also important that any transceiver you use meets the 10GbE performance and reliability specifications.

**CAUTION!**

The SFP+ transceiver from Infortrend contains a laser diode featuring class 1 laser. To ensure continued safety, do not remove any covers or attempt to gain access to the inside of the product. Refer all servicing to qualified personnel.

CLASS 1 LASER PRODUCT

Host Port Dust Plugs

Each host port comes with a dust plug. Remove these dust plugs only when you are ready to insert an SFP+ transceiver.

Other Concerns

- When selecting the number of hard drives to be included in a logical drive, the host channel bandwidth and the mechanical performance of individual disk drives should be considered.

It is a good practice to calculate performance against the host port bandwidth when designing an application topology. As diagrammed below, if eight (8) members are included in a logical drive and this logical drive is associated with a host ID (LUN mapping), the combined performance of this logical drive will approximate the channel bandwidth. If, for example, two 8-drive logical arrays are associated with two IDs residing on a single host channel, there may be a trade-off with performance.

If your system comes with dual controllers for a total of 4 host ports, it will be a good practice you obtain more disk drives by attaching a JBOD so that you can create 4 8-member logical drives. These 4 logical drives leverage the bandwidth of all 4 host ports.

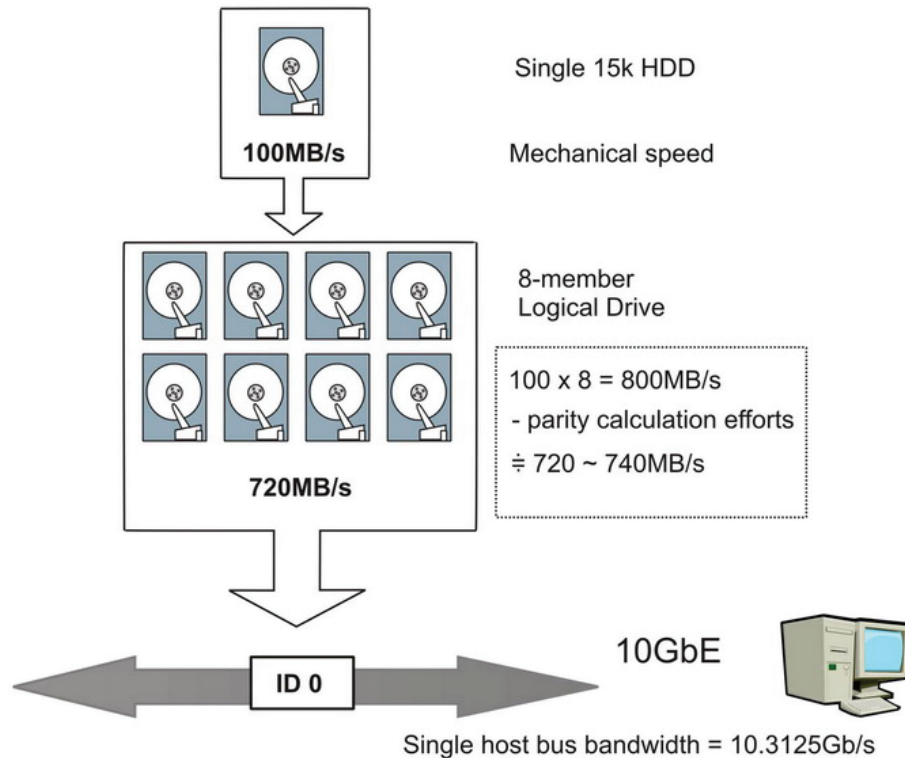


Figure 3-1: Drive Mechanical Speed Combined into Logical Drive Speed

There are other considerations. For example, a spare drive carries no data stripes and will not contribute to disk-level performance. Refer to the documentation for your hard drives for performance data.

- When cabling, follow all the Ethernet network specifications. Pay attention to signal quality and avoid electronic noise from adjacent interfaces, e.g., do not lay power cords on data cables.
- The disk drives in the same logical array should have the same capacity, but it is preferred that all the drives within a chassis have the same capacity.
- Disk drives in the same logical drive should have the same capacity, but it is preferred that all the disk drives within a chassis have the same capacity. Tiered storage configuration is supported, e.g., 150GB SAS drives in your RAID enclosure and 750GB SATA drives in JBODs. However, you should not include both SAS and SATA drives in a logical drive.
- A spare drive should have a minimum capacity that is equivalent to the largest drive that it is expected to replace. If the capacity of the spare is less than the capacity of the drive it is expected to replace, the controller will not proceed with a failed drive rebuild.
- When rack-mounted, leave enough slack in the cables so that they do not bend to a diameter of less than 76mm (3 inches) when.
- Route the cables away from places where it can be damaged by other devices, e.g., foot traffic or fan exhaust.

- Do not over-tighten or bend the cables.

3.1.2 Topology and Configuration Considerations

Host-side Topologies

The primary concern for configuring host-side topologies is to avoid points of failure. It is therefore recommended that the host ports be connected to at least two (2) HBAs. It is also preferable to apply Ethernet switches.



NOTE:

In order to manage the fault-tolerant data paths and to optimize data throughput on multiple data paths, it is necessary to apply Infortrend's EonPath multi-pathing software.

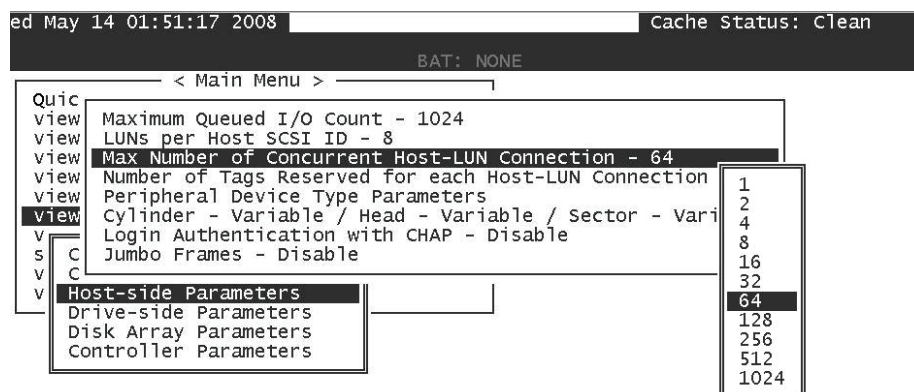
Device Mapper on Linux is also supported. Check on Infortrend's website for application notes.

Associated Host-side Parameters

NOTE that there is a chapter dedicated to all iSCSI-related settings in your firmware operation manual for features such as Link Aggregation, MC/S, etc.

It will be necessary to fine-tune your host-side parameters if you are attaching the S16E system in a complex, multi-host SAN environment. The options can be found in terminal console with firmware in Main Menu -> View and Edit Configuration Parameters -> Host-side Parameters. For example, you may need to enlarge values for the following parameters:

Maximum Concurrent Host LUN Connection (“Nexus” in SCSI)



The "Max Number of Concurrent Host-LUN Connection" menu option is used to set the maximum number of concurrent host-LUN connections. Change this menu option setting only if you have more than four logical drives or partitions. Increasing this number might increase your performance.

Maximum concurrent host LUN connection (nexus in SCSI) is the arrangement of the controller internal resources for use with a number of the current host nexus.

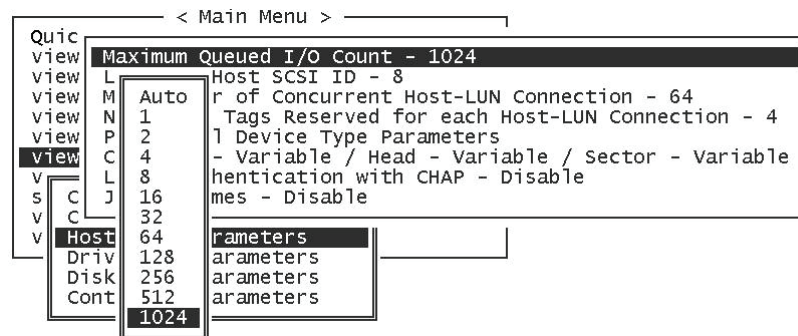
For example, you can have four hosts (A, B, C, and D) and four host IDs/LUNs (IDs 0, 1, 2 and 3) in a configuration where:

- Host A accesses ID 0 (one nexus).
- Host B accesses ID 1 (one nexus).
- Host C accesses ID 2 (one nexus).

These connections are all queued in the cache and are called four nexus.

If there is I/O in the cache with four different nexus, and another host I/O comes with a nexus different than the four in the cache (for example, host A accesses ID 3), the controller returns busy. This occurs with the concurrent active nexus; if the cache is cleared, it accepts four different nexus again. Many I/O operations can be accessed via the same nexus.

Maximum Queued I/O Count



The "Maximum Queued I/O Count" menu option enables you to configure the maximum number of I/O operations per host channel that can be accepted from servers. The predefined range is from 1 to 1024 I/O operations per host channel, or you can choose the "Auto" (automatically configured) setting. The default value is 256 I/O operations.

The maximum number of queued I/O operations is 4096.

The appropriate "Maximum Queued I/O Count" setting depends on how many I/O operations attached servers are performing. This can vary according to the amount of host memory present as well as the number of drives and their size. If you increase the amount of host memory, add more drives, or replace drives with higher performance, you might want to increase the maximum I/O count. But usually optimum performance results from using the "Auto" or "256" settings.

For more information, please refer the firmware Operation Manual that came with your system.

3.2 Sample Topologies

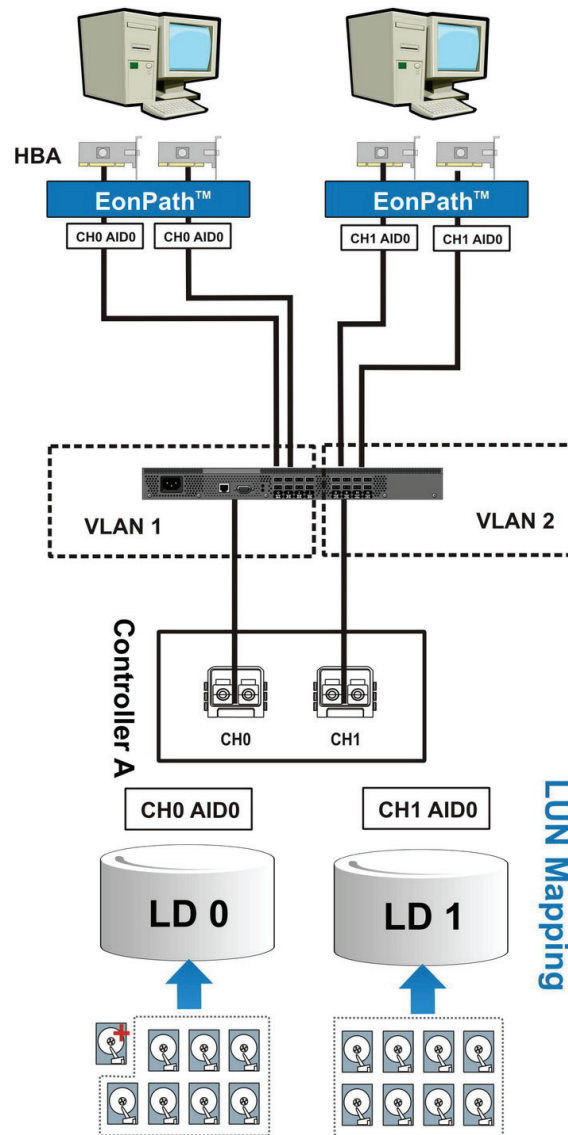


Figure 3-2: SAN Connections, S16E-G1240

Channels	Controller A
Host	CH0 & CH1
Configuration Information	
RAID controllers	1
Host servers	1
Data path connection	Single data paths
Host channel bandwidth	Approx. 2000MB/s

With more disk drives over the SAS expansion links, you can create more logical groups of drives. Avail these logical drives using more host channel IDs or LUN numbers.

The access from the two servers are segregated by VLANs. If a server has multiple data paths to the storage network, the EonPath multi-pathing driver or Linux Device Mapper will be necessary.

Sample 3: SAN Connections (S16E-R1240).

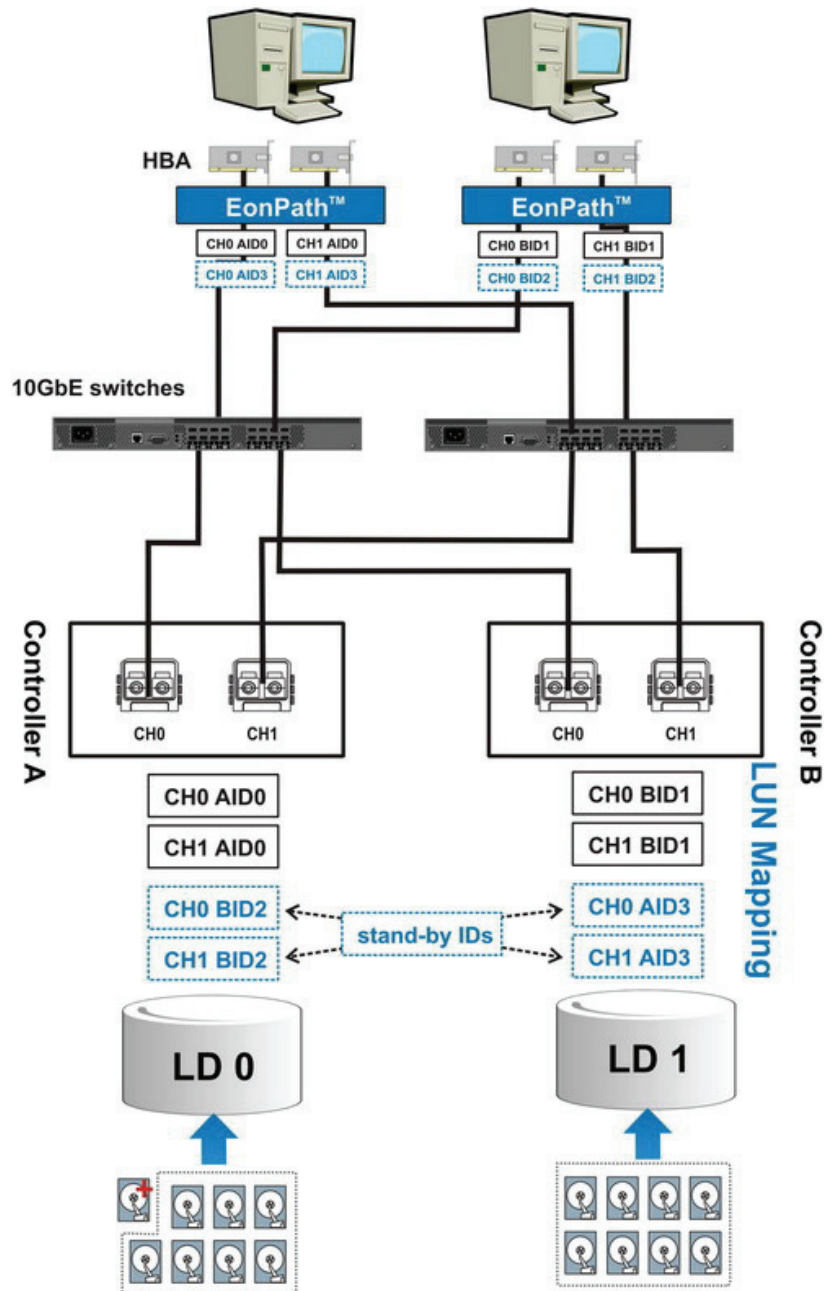


Figure 3-3: SAN Connections

Channels	Controller A	Controller B
Host	CH0 & CH1	CH0 & CH1

Configuration Information	
RAID controller	2
Host server	2
Data path connection	Fault-tolerant data paths. Access can be continued if the event of cabling or RAID controller failure. If Clustering is applied, a standby node can access all volumes through stand-by IDs. TPGS is supported with the use of EonPath driver (formerly known as ALUA), which provides the awareness of preferred paths over stand-by links.
Host channel bandwidth	Approx. 4000 MB/s

Above is the sample drawing showing fault-tolerant links in a SAN environment. Multiple logical drives can be created and each mapped to the corresponding host channel ID/LUN combinations.

Note that Infortrend's **EonPath** multi-pathing software is necessary for controlling and optimizing the access to logical drives via multiple data paths.

Each logical drive is redundantly mapped to multiple host channel IDs in an A-A-P-P (Active-Active-Passive-Passive) configuration. The Passive IDs will only become functional when a single controller fails in the system. The EonPath driver is a must on the application server. The driver communicates with system firmware and performs load balance and automated distribution of I/Os across preferred paths (Active IDs on data paths). TPGS (Target Port Group Service) is supported.

Use the configuration utility provided with your iSCSI initiators to limit the access from server to LUNs (mapped logical drives). Otherwise, all servers connected via switches will see a mapped LUN.

3.3 Cabling

Following are steps that should be completed with cabling:

1. Maintain a configuration plan. In addition to cabling topologies and list of networking components, the plan can also include firmware and software maintenance details.
2. Confirm that you have a cable loops 6-inch or longer.
3. Ensure proper airflow and keep cables away from ventilation airflow outlets.

Cabling Steps:

- Step 1.** Remove the SFP+ module from its static-protective package.
- Step 2.** Remove the dust plug from the SFP+ transceiver module. Save the dust plug for future use.

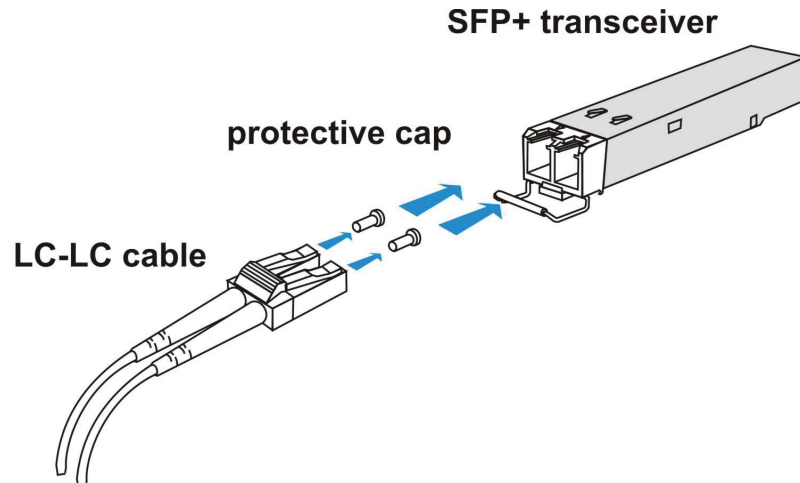


Figure 3-4: Connecting SFP+ Transceiver and LC Type Cables

- Step 3.** Remove the dust plugs from the RAID system SFP+ ports.
- Step 4.** Insert the SFP+ module into the system host ports. The module will click into place.
- Step 5.** Connect an LC-to-LC type cable.
- Step 6.** Remove the two protective caps from the LC-to-LC type cable. Save the protective caps for future use.
- Step 7.** Carefully insert the cable into an SFP+ module that is already on the system. The cable connector is keyed and will click into place.
- Step 8.** Remove the protective caps on the other end and connect this end to an SFP+ transceiver module on a switch port or a 10GbE host bus adapter (HBA) port.

3.4 Expansion Links

Expansion Links:

The SAS expansion port connects to expansion enclosures, i.e., Infortrend's S16S-J1000-R/S. For a dual-controller system, each expansion port connects a RAID controller to a corresponding JBOD controller making fault-tolerant links to different SAS domains.

There are two principles with the combinations of RAID and JBOD:

- 1). Dual-controller RAID connects to dual-controller JBODs;
Single-controller RAID connects to single-controller JBODs.
- 2). You should have one or two **SFF-8088 to SFF-8470** cables for JBOD connections. An example is **IFT-9270CmSASCab5-0030**, 170cm external multi-lane cable. These two connector types are both made for 4x multi-lane SAS connections, only that their form factors and latching mechanisms are different.

RAID Model	3U JBOD	Configuration
S16E-R1240	S16S-J1000-R	Dual-controller; fault-tolerant paths
S16E-G1240	S16S-J1000-S	Single-controller; single, straight-through path

Table 3-1: EonStor S16E RAID and JBOD Matching Table

Enclosure ID:

There is a rotary ID switch on every expansion enclosure that is manually configured using a small, 1/8", flat blade screwdriver.

Configuring enclosure IDs:

1. The configurable IDs start from 1 to 6. Usually the numbering starts from the one closest to the managing RAID enclosure.
2. The S16E connects to a maximum of **6** JBODs.
3. Make sure a unique ID is configured on each JBOD so that the SAS WWN addresses of disk drives can be properly assigned. RAID system firmware automatically manages these addresses.

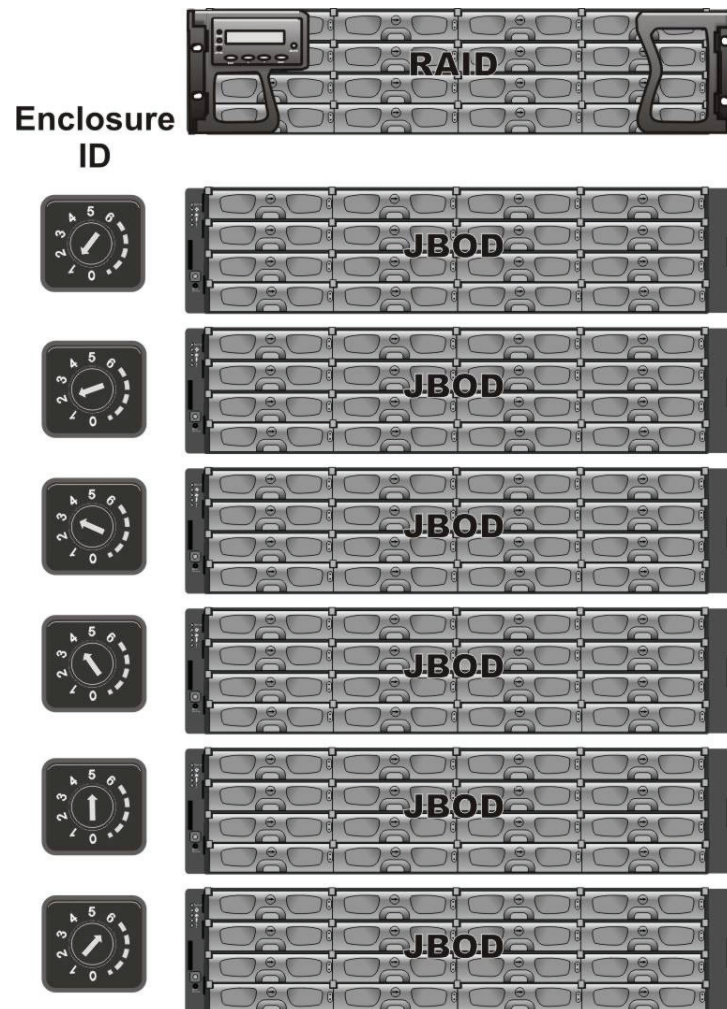


Figure 3-5: JBOD Enclosure IDs

SAS Expansion Links

Physical Connections from a Redundant-controller RAID to 3U Dual-controller JBODs: S16E-R1240 to S16S-J1000-R

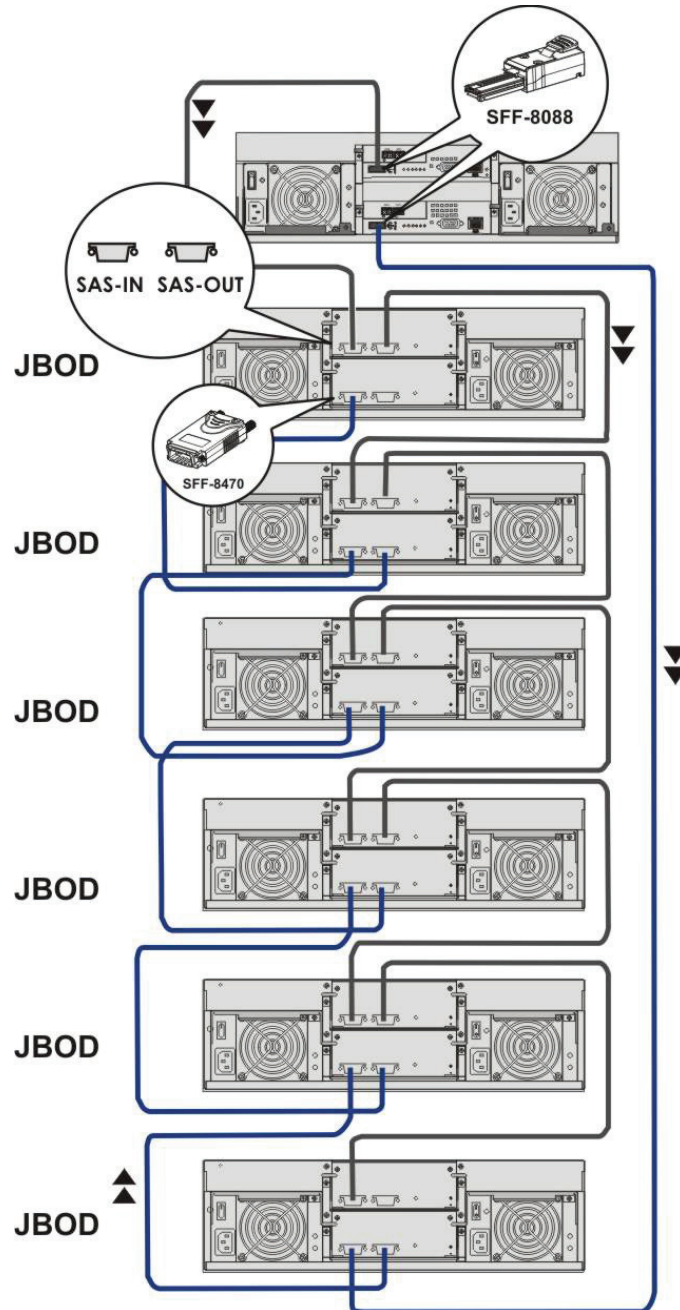


Figure 3-6: Redundant-controller RAID to 3U Dual-controller JBODs

Configuration Rules:

Following are the rules for connecting SAS interfaces across RAID and JBOD enclosures:

1. If **SATA** drives are deployed in a dual-controller configuration, make sure **MUX** boards are available for disk drives.
2. Fault-tolerant links in a dual-controller combinations: Corresponding to SAS drives' **dual-ported** interface, two (2) different ports are available from each disk drive, routed across the backplane board, each through a SAS expander, and then interfaced through a 4x wide external SAS port.

With data paths through separate SAS domains, access to disk drives can be continued in the event of a cable link or SAS JBOD controller failure.

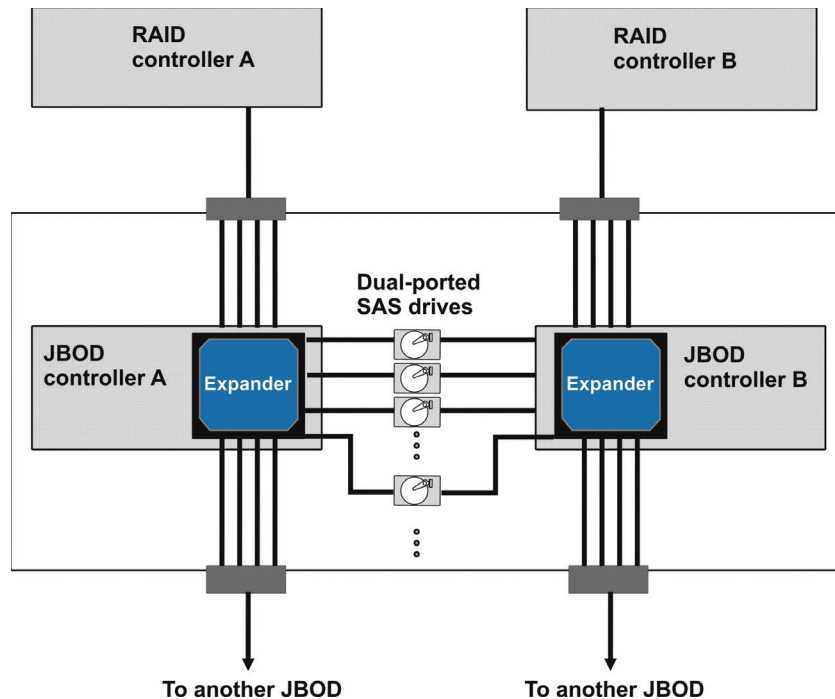


Figure 3-7: Fault-tolerant Links to SAS disk Drives

3. Two shorter, 50cm, SFF-8470 to SFF-8470, SAS expansion cables will be available with Infortrend's JBODs. Note that if many JBODs are connected, a longer SAS external cable (e.g., a 170cm cable) may be necessary for connecting a JBOD from the opposite direction offering high redundancy. Please visit Infortrend's website for a list of accessories items.

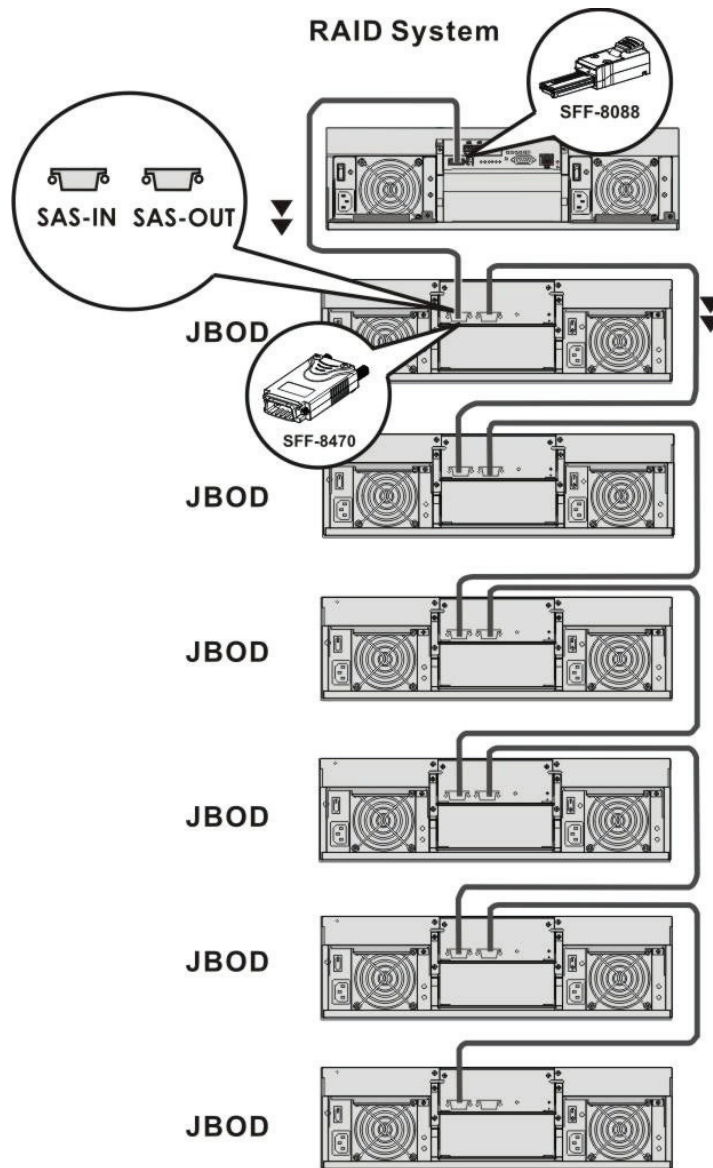
One expansion link connects JBODs from the nearest JBOD, and then to the farthest JBOD. Another expansion link connects to the farthest JBOD from the opposite direction and then to the nearest JBOD. Connected this way, even an entire JBOD failed in the configuration, the connections to other JBODs will still be available.

4. Each expander controller on the SAS JBOD controls a "**SAS Domain**" that connects one of the alternative interfaces on all of

the disk drives in the enclosure. For example, one expander unit controls Domain A, and the other controls Domain B. In a fault-tolerant topology, the SAS external links always connect to the SAS ports on the same SAS Domain.

The SAS Domains can be identified by the expanders' locations, i.e., upper controller slot (Controller A/Slot A) or the lower controller slot (Controller B/Slot B).

5. On the RAID system, each RAID controller can be considered as managing a separate SAS Domain. With the help of the port selector mechanism on the MUX boards, the idea of SAS Domain applies even when SATA drives are used in a dual-controller JBOD.

Single-controller RAID to 3U single-controller JBODs:**S16E-G1240 to S16S-J1000-S****Figure 3-8: Single-controller RAID to 3U Single-controller JBODs****NOTE:**

Because of the different port connectors on RAID and JBODs, an SFF-8088 to SFF-8470 cable will be necessary when connecting to JBODs. You can find information about all accessories on Infortrend's website.

3.5 Connecting Other Interfaces

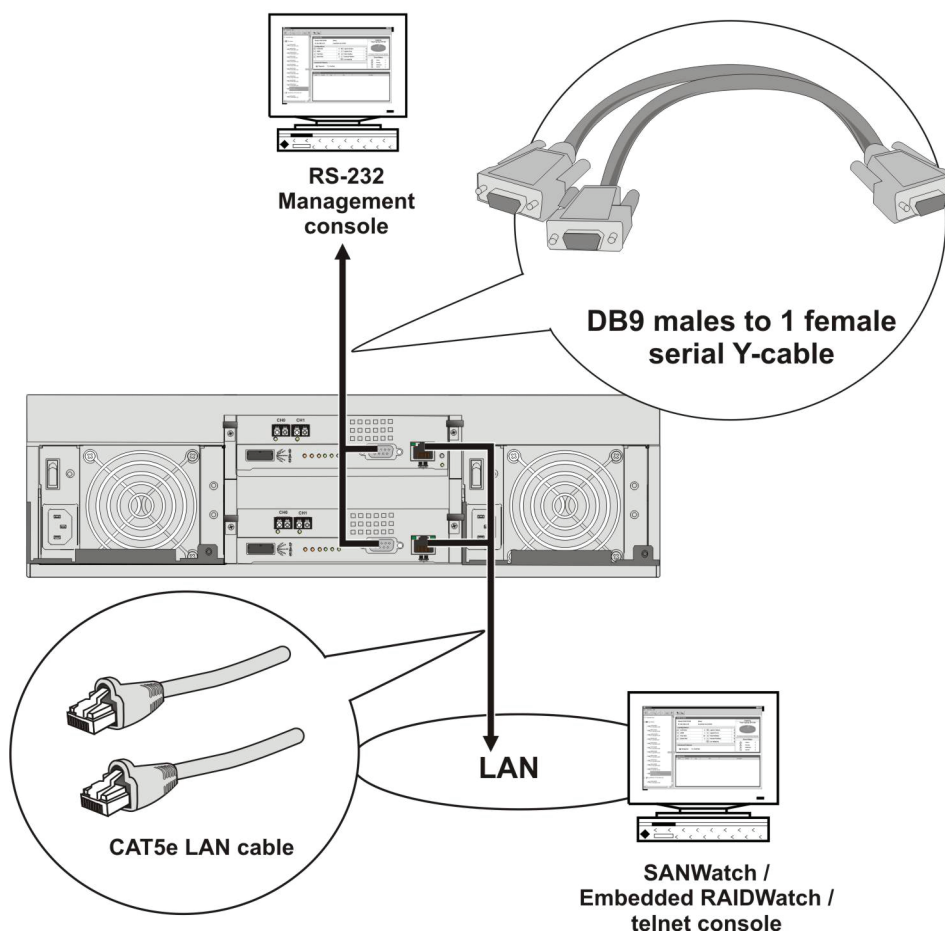


Figure 3-9: Connecting Serial Port and Ethernet Ports

Single-controller S16E-G1240: Serial cable and LAN cable are user-supplied.

Dual-controller S16E-R1240: A serial port Y-cable is provided in package. LAN cables are user-supplied.

The serial port's defaults are:

Baud rate	38400
Data bit	8
Parity	none
Stop bit	1
Flow control	Hardware

Table 3-2: Serial Port Defaults

For TCP/IP connection and firewall configuration with a management station running SANWatch, please refer to SANWatch's online help or User's Manual.

3.6 Connecting Power Cords

Use the included cable clamps to secure power cord connections.

Step 1. Remove power cords and cable clamps from the accessory boxes.

Step 2. Combine cable strap with cable clamp.

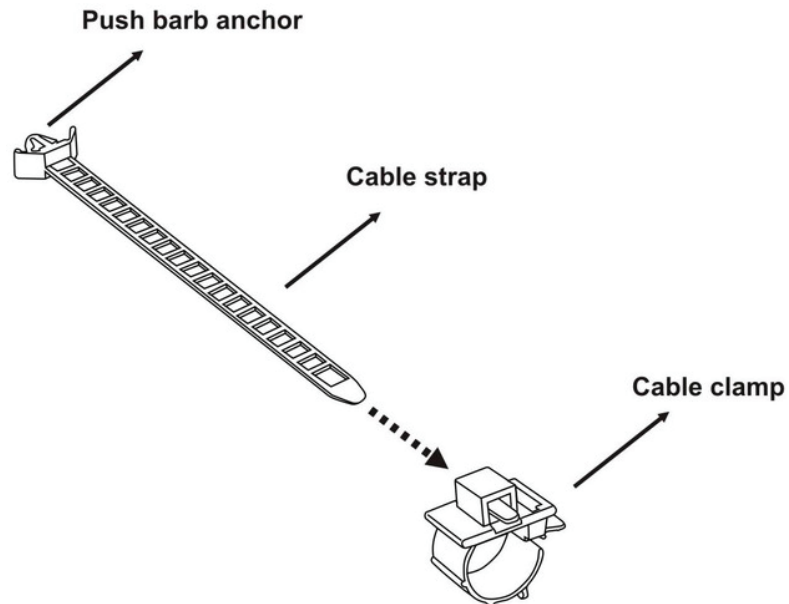


Figure 3-10: Combining Cable Strap and Cable Clamp

Step 3. Attach cable clamps to the power cords by opening and enwrapping the plastic ring around the base of power cords.

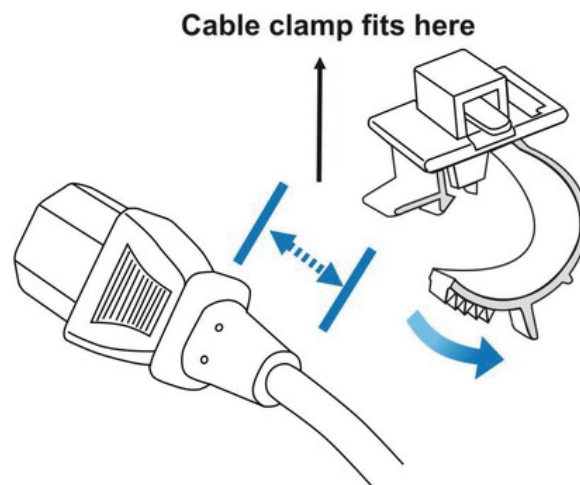


Figure 3-11: Attaching Cable Clamps to Power Cords

Step 4. Adjust the position of cable straps using the release tab. Adjust the position so that when a power plug is connected to system power the barb anchor can be inserted into the anchor hole above the power socket.

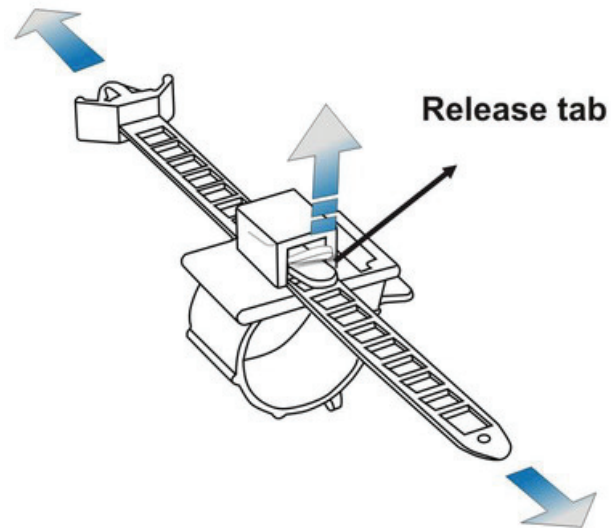


Figure 3-12: Adjust Cable Strap Position

- Step 5.** Connect power cords to system power supplies and insert the barb anchor into the anchor holes above the power sockets.

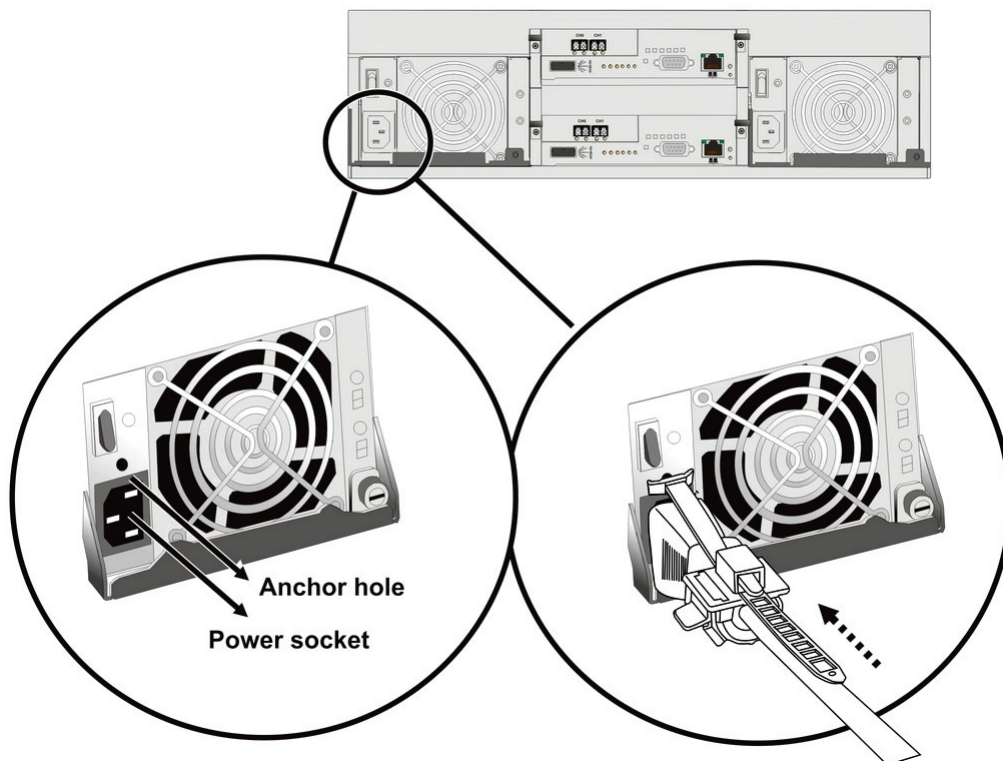


Figure 3-13: Attaching Power Cords

3.7 Power On

Once all of the components have been installed in the system and the cabling links have been adequately connected, the system can be powered on.

Check List

BEFORE powering on the system, please check the following:

- ❑ **CBM:** Make sure CBM has been installed correctly (CBM selected as an add-on module for S16E-G1240).
- ❑ **Hard drives:** Hard drives have been installed in the drive trays.
- ❑ **Drive trays:** All the drive trays, whether or not they contain a hard drive, have been installed into the system.
- ❑ **Cable connections:** The system has been correctly connected to host computer(s), network switches, or HBAs, and SBODs.
- ❑ **Power cords:** The power cords have been connected to the PSUs on the system and plugged into the main power source.
- ❑ **Ambient temperature:** All the system components have been acclimated to the surrounding temperature.

Power On Procedure

When powering on the system, please follow these steps:

Step 1. Power on the Ethernet networking devices.

These devices include Ethernet switches, and any other such devices connected between application servers and storage. Please refer to the documentation that came with your networking devices to see the power-on procedure.

Step 2. Power on the expansion enclosures (JBOD) attached to the RAID system.

If you have connected JBODs to the system, power on these JBODs, and wait for their Drive Busy LEDs to blink.

Step 3. Power on the system.

The system should be powered on before the application servers. Power on using the two (2)

power switches on. Each switch controls a single PSU. Make sure that both switches are turned on.

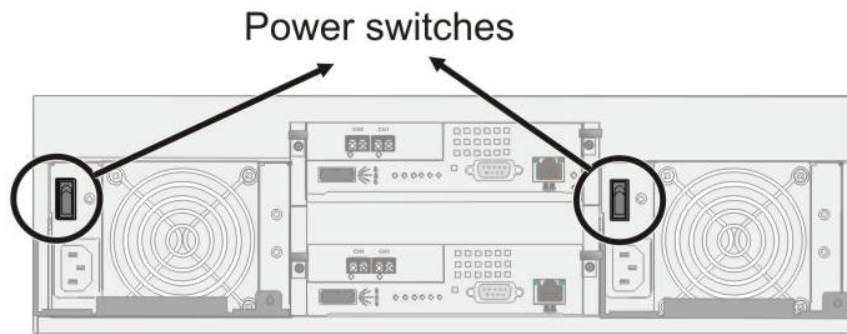


Figure 3-14: Power Switches

Step 4. Power on the application servers (host computers.)

The application servers should be the last devices that are turned on. Please refer to related documentation for their power-on procedures.

Power On Status Check

Once the system is powered on, all aspects of its operating statuses should be carefully observed to ensure that there are no complications or malfunctions.

1. **Controller module LEDs:** The Controller Ready, Host Busy, and Drive Busy LEDs should all flash green after the initialization process.
2. **Drive tray LEDs:** The green LEDs for all populated drive trays should light constant blue after the initialization process.
3. **LCD panel LEDs:** The Power LED on the LCD panel should light blue, and the ATTN LED should be flashing red during the initial stage and will turn off once the initialization is completed.
4. **Host Port LEDs:** The LEDs underneath each host port should illuminate green, indicating that the cable link has been established.
5. **CBM LEDs:** The CBM presence LEDs on controller faceplates should light green, indicating that the BBU is present.
6. **PSU LEDs:** If the PSU is operating normally and experiencing no problem after power on, the LEDs on the PSU should light green constantly.

7. **Firmware and SANWatch:** Various aspects of the system operating information can be accessed through the firmware configuration utility or the SANWatch GUI.
8. **Audible alarm:** If any errors occur during the initialization process, the onboard alarm will sound in a hastily repeated manner.
9. Drive BUSY LEDs should start flashing during the power-up process, indicating that the RAID controllers are attempting to access the hard drives.

**NOTE:**

The system has been designed to run continuously. If a component fails, faults can be corrected online.

LCD Screen

When powering on the system, wait for the front panel LCD screen to show “**READY**” or “**No Host LUN**” before you power up the application servers.

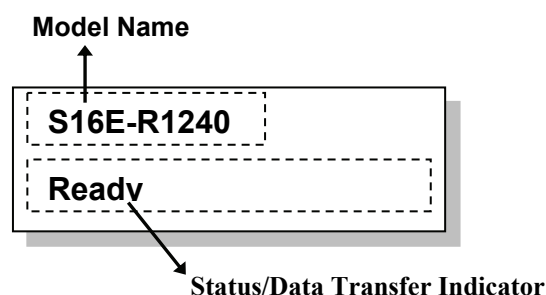


Figure 3-15: The LCD Initial Screen

The LCD screen startup sequence is shown and described in the sequence below:

**Initializing....
Please Wait...**

This screen appears when the PSUs are turned on.

**Power On Self
Test Please Wait...**

System is performing a self test.

**Power on
Init Completed..**

System power-on self test is completed.



System is accessing various interfaces.



Verifying installed memory.



System is ready. You can now start to configure the system.



System is ready for I/Os.

3.8 Power Off Procedure

If you wish to power down the system, please follow these steps:



NOTE:

If you wish to power down the system, please make sure that no time-consuming processes, like a “logical drive parity” check or a “background scrub,” are running.

Step 1.

Stop I/O access to the system.

Close your applications to stop all IO accesses to the system. Please refer to the documentation that came with your applications. Note that data might still be cached in servers. Please refer to related information of your applications.

Step 2.

Flush the cache.

Locate the C_Dirty LED on the controller module to check if there is still cached data in memory. Use the **Shutdown Controller** firmware function to flush all cached data. This prepares the RAID system to be safely powered down.

Step 3.

Turn off the power.

Once the system has been powered down, other enclosures attached to the system may be sequentially powered down.

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Chapter 4

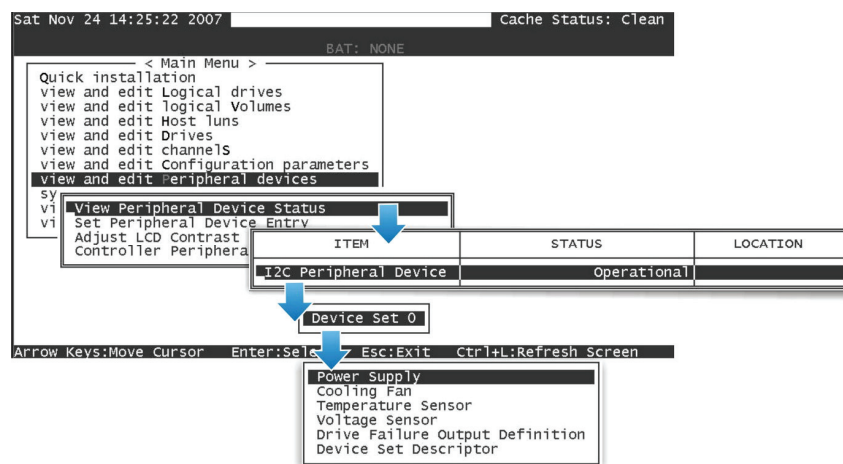
System Monitoring

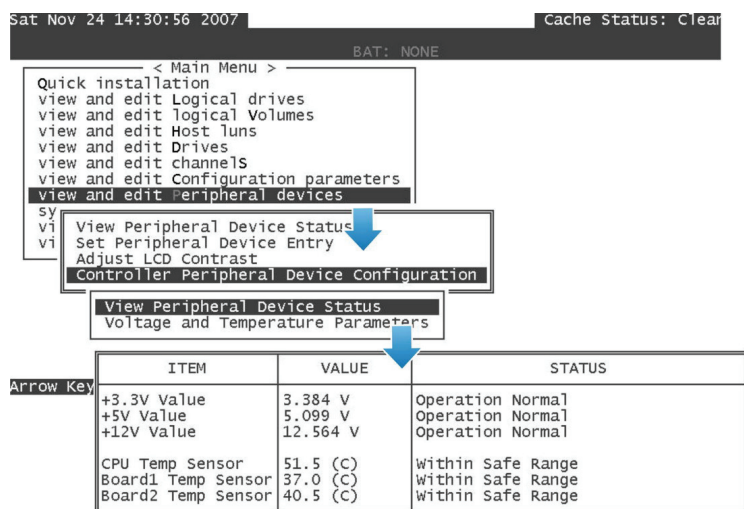
4.1 Overview

The S16E system is equipped with a variety of self-monitoring features that help keep system managers aware of system operation statuses.

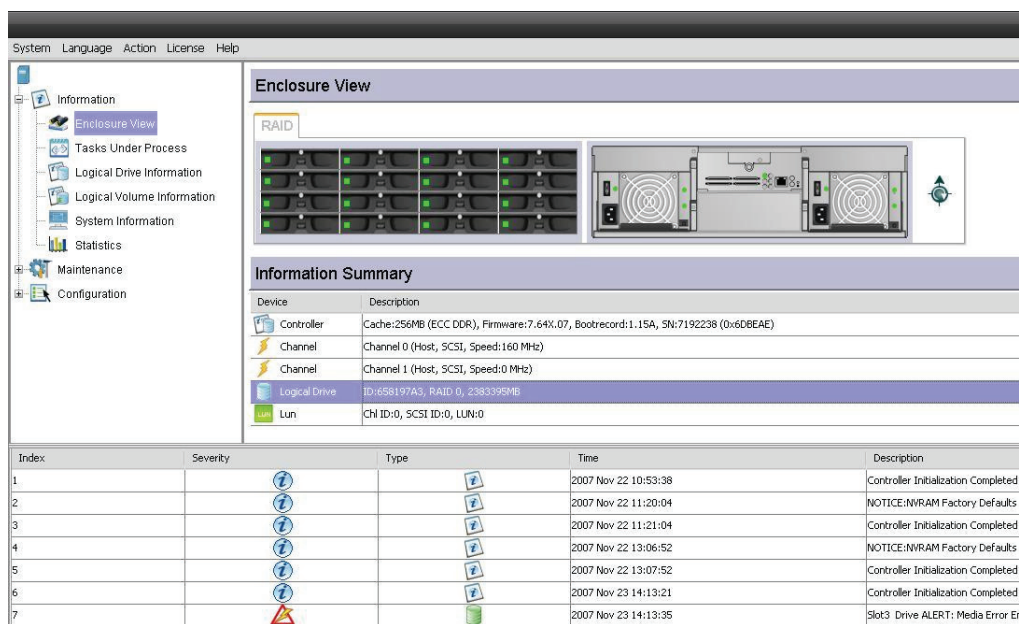
The monitoring features include:

- **Firmware:** The RAID controller in the system is managed by a pre-installed firmware, which is accessed using a PC hyper-terminal via the COM1 serial port. Device statuses can be obtained from the menu-driven configuration utility. Firmware features are fully described in the **Operation Manual** that came with your system.

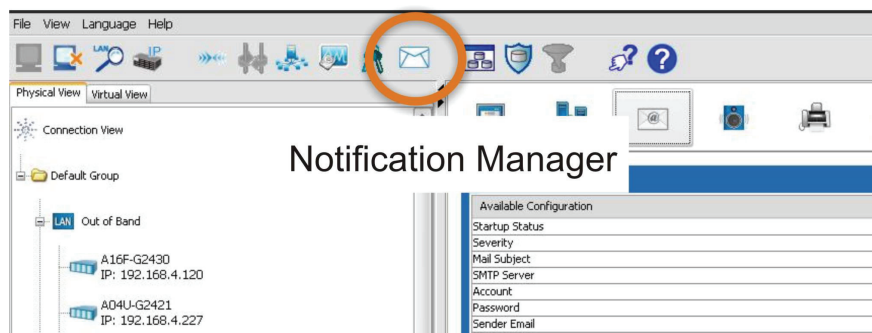




- **SANWatch:** SANWatch is a fully integrated, Java-based, Graphical User Interface (GUI) that came with the system and can be used to monitor and maintain the subsystem locally or remotely over TCP/IP network. The management session is made using the 10/100BaseT management port. Please refer to the **SANWatch User's Manual** for further details.



Use SANWatch's Notification Manager to set up automated event notification via Email, MSN, broadcast, etc.



- **LEDs:** LEDs are located on all modules. These LEDs indicate the integrity of a given component or a host/management link. You should become familiar with the various LEDs and their definitions.
- **Audible alarm:** An audible alarm is present on the system controller board and will be triggered if any of a number of threatening events occurred.

4.2 Status-indicating LEDs

4.2.1 LCD Keypad Panel

The LCD keypad as shown in **Figure 4-1** consists of five (5) buttons, three (3) LEDs, and a 16x2-character LCD screen that provides access to firmware-embedded utility. Press the **ENT** button for two (2) seconds on the initial screen to enter the main menu. Press the **ESC** button to skip the current event.

Function Keys:

Press the **UP** and **DOWN** arrow keys to select viewing items. In the bottom row of the main menu, "View and Edit Event Logs," the most recent event is displayed.

Browsing Events:

To see detailed description of each event, use the arrow keys to select an event, and press and hold down the **ENT** key until an event ID is shown on the screen, then use arrow keys to browse through the description lines. If you tab the **ENT** key lightly, system will prompt you to delete all events.

Mute Button:

The **MUTE** button silences the alarm temporarily until the next event occurs.

The definitions of LEDs on the panel are given in **Table 4-1** below.



Figure 4-1: LCD Keypad Panel

Name	Color	Status
PWR (Power)	Blue	ON indicates that power is supplied to the system, and system state is normal. OFF indicates that no power is supplied to the system or the RAID controller has failed.
BUSY	White	FLASHING indicates that there is active traffic on the host/drive channels. OFF indicates that there is no activity on the host/drive channels.
ATTEN (Attention)	Red	ON indicates that a component failure/status event has occurred. OFF indicates that the subsystem and all its components are operating correctly.

Table 4-1: LCD Panel LED Definitions

**NOTE:**

During the power-on process, the ATTN LED will light up steadily. Once the subsystem successfully boots up with no faults, the ATTN LED will turn off.

4.2.2 Drive Tray LEDs

Two (2) LED indicators are located on the right side of each drive tray. Refer to **Table 4-2** for the LED definitions. When notified by a drive failure message, you should check the drive tray indicators to find the

correct location of the failed drive. Replacing the wrong drive can fail two members of a logical array (RAID 3/5) and thus destroy data in it.

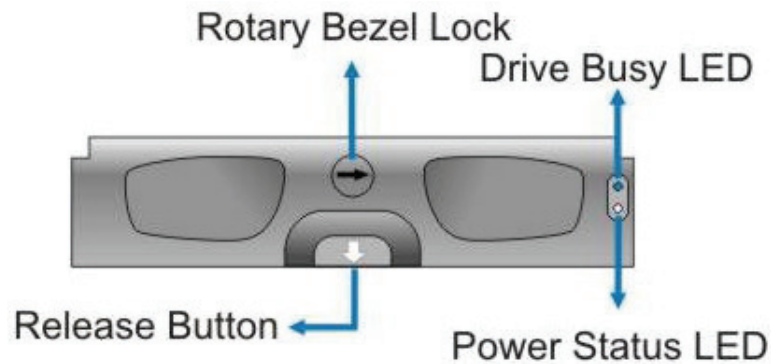


Figure 4-2: Drive Tray LEDs

Name	Color	Status
Drive Busy	Blue	FLASHING indicates data is being written to or read from the drive. The drive is busy. OFF indicates that there is no activity on the disk drive.
Power Status	Green/ Red	GREEN indicates that the drive bay is populated and is working normally. RED indicates that the disk drive has failed, or a connection problem occurred.

Table 4-2: Drive Tray LED Definitions

4.2.3 Controller Module LEDs

The LEDs on the rear-facing faceplate of the RAID controller are shown in **Figure 4-3**. The controller LEDs are numbered from 1 to 6. The definitions are shown below.

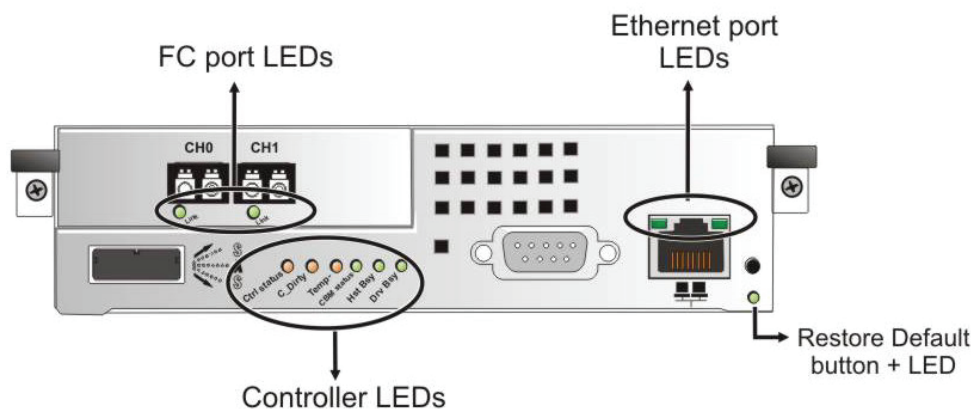


Figure 4-3: Controller Module LEDs

Name	Color	Status
Ctlr Status	Green/ Amber	Green indicates that a RAID controller is operating healthily. Amber indicates that a component failure has occurred, or inappropriate RAID configurations have caused system faults. It is also lit during the initialization process.
C_Dirty	Amber	ON indicates the following: - Certain amounts of cached data held in memory. - Errors occurred with cache memory (ECC errors) - Cached data is sustained by battery backup. - Battery voltage is lower than 2.5V. - Battery temperature reading is abnormal (out of the 0 to 45°C range). - Battery is not present. OFF indicates that the cache is clean, and that the battery backup unit is capable of sustaining memory in case of power loss. This signal is local to each controller.
Temp.	Amber	ON indicates that the detected CPU/board/chassis temperature has exceeded the higher temperature threshold. OFF indicates that the detected temperature reading is within the safe range.
CBM Status	Green/ Amber	Green steady on indicates the CBM module is ready. Both a BBU and flash modules are present. Fast blinking indicates BBU is charging. Amber steady on indicates CBM failure, meaning either BBU or flash has failed. When lit, it also indicates either BBU or a flash is missing in a redundant-controller system. Blinking means a BBU is being charged. OFF means BBU is not installed in a single-controller “G” model.
Hst Bsy	Green	Rapidly Blinking to indicate traffic on the host bus.
Drv Bsy	Green	Rapidly Blinking to indicate traffic on the drive channels.
Restore	Green	Lit Green to indicate the RAID configuration default has been successfully restored. The LED state will be

Default		invalidated after a few seconds.
		See below for how to use the push button.

Table 4-3: Controller LED Definitions

How to Use the Restore Default Button?



CAUTION!

The Restore NVRAM Default push button should be considered as a last-resort function. Although restoring firmware defaults will not destroy the existing logical drives; however, detailed configurations, such as various parameters and host LUN mappings, will be erased.

There is a non-latch type push button accessed through an opening on the controller faceplate.

Why restoring defaults?

1. Some of the latest firmware updates may be incompatible with the firmware currently running on your system. These updates may require restoring firmware defaults before firmware upgrade can actually take place. Before using the button, it is highly advised to practice the following:
 - Stop host I/Os,
 - Save NVRAM, (you can save NVRAM contents either on a terminal console, Embedded RAIDWatch, or using the SANWatch software)
 - Make a list of host ID/LUN mapping information for future references.

You may also jot down the configuration parameters such as the performance preferences, specific stripe sizes, etc.

2. Firmware has an embedded 1GB threshold for internal settings such as the supported no. of logical drives. When you upgrade controller DIMM module, say, from 512MB to 2GB, you need to restore firmware defaults after you upgrade your DIMM module size to 2GB.
3. Another condition that requires restoring defaults is when a system administrator forgets the password controlling the access to a RAID system. Before pushing this button, also practice the steps listed above. You can access configuration screen and manually record array information even without a password.

Listed below are the necessary procedures that should be completed before using this button:

1. Before pressing this button to restore firmware defaults, it is highly advised to save your current configuration using the **“Save NVRAM”** function in firmware utility or the SANWatch GUI.
2. You may also make a list of the existing ID/LUN mapping information. You will need the list for restoring ID/LUN mapping after restoring defaults. Default restoration will erase the ID/LUN mapping associations (e.g., which logical drive is associated with which host ID/LUN), and it will be necessary to restore the previous settings using the **“Restore NVRAM from Disks”** or **“Restore NVRAM from Files”** functions. Configurations such as ID/LUN mapping will be restored after a system reset.

How to use the button?

Single-controller system:

After the system is powered down, you can use a straighten paper clip to press the button. Press and hold the button down, power on the system, and wait for the associated LED and the system **Ready** LED to light up. The **“Restore Def.”** LED and the firmware **“Default Restored”** event message will indicate a successful restoration of firmware defaults.

Redundant-controller:

With redundant RAID controllers, the procedure can be more complicated:

- Step 1.** Remove controller B (controller in the lower controller bay) from the subsystem, power down, and then power on with the **“Restore Def.”** button depressed to restore the firmware defaults on the remaining controller. Another person should stand on the front of rack to help observe the LCD screen message.
- Step 2.** When the **“Restore Def.”** LED is lit and the **“default restored”** firmware event appears on the LCD screen, release the button. You may ask your colleague to observe the message on the front of the chassis to see if the **“default restored”** event appears.
- Step 3.** Power down, install controller B to the controller A slot, and repeat the restoration process.
- Step 4.** When completed with restoring defaults on both controllers, install both controllers and power on.

4.2.4 10G Host Port LEDs

The LEDs with the 10G iSCSI port are shown below.

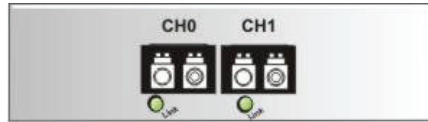


Figure 4-4: 10G iSCSI Host Port LEDs

Name	Color	Status
Link	Green	ON indicates an established link, Off means a link is broken. Blinking indicates there is active traffic through the host ports.

Table 4-4: 10G Host Port LED Definitions

4.2.5 Ethernet Port LEDs

One (1) 10/100BaseT Ethernet port is located on each controller's faceplate. Shielded Cat5e straight-through Ethernet cables can be used to connect the RJ-45 ports to the network. Two (2) LEDs located on each Ethernet port indicate the Ethernet connection speed and link status. See the diagram below for the locations of the two (2) LED indicators.

10/100 Link/Activity

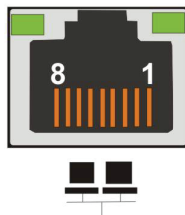


Figure 4-5: 10/100BaseT Management Port Indicators

Name	Color	Status
10/100	Green	ON indicates a valid link of the 100Mbit speed. OFF indicates a link with 10Mbit speed.
Link/Activity	Green	ON indicates a valid link. BLINKING indicates active transmission.

Table 4-5: 10/100BaseT Management Port LED Definitions

4.2.6 PSU LEDs

Each PSU comes with a single LED located near the power switch. This LED indicates the operational status of the PSU module.

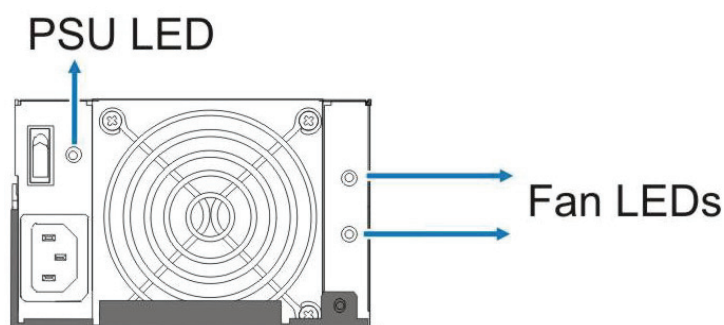


Figure 4-6: PSU Module LED

Color	Status
Steadily Blinking Green	The power supply has not been turned on. The PSU module LED will blink when the system is connected to a power source but not yet turned on.
Static Green	The PSU is operating normally and experiencing no problem.
Static Red	The PSU has failed and is unable to provide power to the system.
OFF	The PSU is not turned on and the power cord is disconnected.

Table 4-6: PSU Module LED Definitions

4.2.7 Cooling Module LEDs

Each individual cooling fan within a cooling module has a corresponding red LED on the PSU module panel. When the LED is on, it indicates one or two cooling fans have failed. When the LED is off, it indicates the fan is functioning properly. Regardless of how many fans failed in the module, a cooling module having a failed fan should be replaced as soon as possible. You can not replace an individual faulty fan in the module.

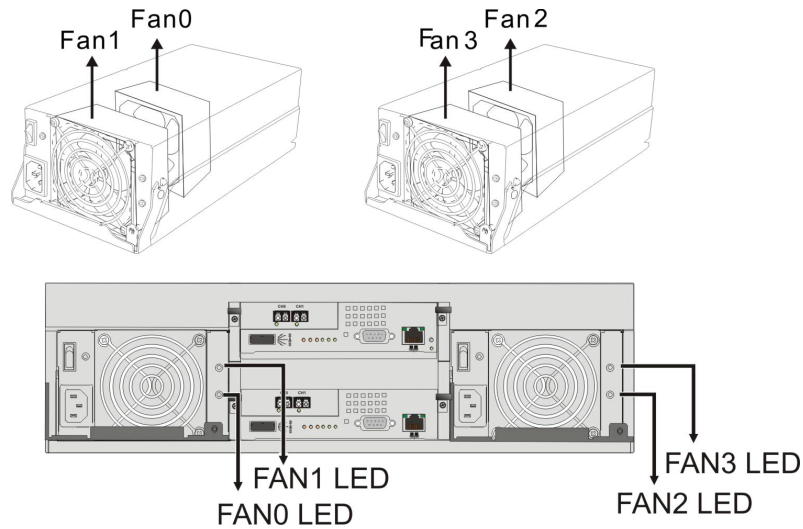


Figure 4-7: Cooling Module LEDs and Cooling Fan Locations

The subsystem has a novel approach to stabilizing the temperature within the subsystem: When sensors on the backplane detect elevated temperature, such as high ambient temperature or the failure of any cooling or PSU module, the system will turn the cooling fans to high speed to extract more heat. Once the ambient temperature cools down to normal or the failed modules have been replaced, the cooling fans will return to low speed.

4.3 Audible Alarm

Different environmental and operational parameters (like temperature, voltage readings, etc.) have been assigned a range of values between which they can fluctuate. If either the upper or lower thresholds are exceeded, an audible alarm will be triggered. The alarm will also be triggered when a component fails. If the system administrator is onsite and hears an alarm, the manager must read the error message on the terminal or SANWatch screen to determine what has triggered the alarm. After determining what has occurred, a system administrator must take appropriate actions to rectify the problem.

The Alarm beep pattern is described in the **Troubleshooting Guide** included in your product CD.



WARNING!

If an alarm is triggered it is necessary for you to determine the problem. If the audible alarm is ignored and the problem is not rectified, unexpected damages may occur.

4.3.1 Alarm Triggers

If any of the following components fails, the audible alarm will be triggered:

- RAID controller module (in a redundant-controller configuration)
- Cooling fan modules
- PSU modules
- CBM module
- Hard disk drives
- Sensors or presence detection circuitries



NOTE:

When temperature exceeds a preset threshold, the controller's charger circuits will stop charging. You will then receive a message that reads "Thermal Shutdown/Enter Sleep Mode." When the temperature falls back within normal range, the battery will resume charging.

4.4 I2C

The operating status of PSU and cooling fan modules are collected through an I²C serial bus. If either of these modules fails, the failure will be detected and you will be notified through the various methods described above.

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Chapter 5

System Maintenance

5.1. Overview

5.1.1 Maintenance



WARNING!

Do not remove a failed component from the subsystem until you have a replacement on hand. If you remove a failed component without replacing it, the internal airflow will be disrupted and the system may overheat.



CAUTION!

1. Do not insert enclosure modules from similar EonStor series models, e.g., a controller module from an S16F. A controller from other enclosure may have acquired a system serial number from it, and have used the serial number to generate a unique ID. The unique ID is consequentially applied to FC port node names. As the result, you may encounter SAN problems with identical port names on multiple systems.
2. Do not use a PSU or cooling module from EonStor ASIC400 series. They look similar. However, they may come with cooling fans with different rotation speeds, and may not be sufficient for your ASIC667 models.

All of the following components can be replaced in case of failure:

1. Controller module – **Section 5.2**
2. Memory module – **Section 5.3**
3. BBU module – **Section 5.4**
4. PSU modules – **Section 5.5**
5. Hard drives – **Section 5.6**

5.1.2 General Notes on Component Replacement

- In a redundant-controller configuration, a RAID controller is hot-replaceable. In a single-controller configuration, a RAID controller is replaced when powered down. All other component modules, including

the PSU modules (along with the cooling modules within), and drive trays, are hot-swappable and can be replaced while the subsystem is operating.

- Qualified engineers who are familiar with the system should be the only ones who make component replacements. If you are not familiar with the subsystem and/or with RAID system maintenance in general, it is strongly advised that you refer system maintenance to a suitably qualified engineer.
- When replacing any hot-swappable component, caution should be taken to ensure that the components are handled in an appropriate manner. Rough or improper handling of components can lead to irreparable damage.
- If removing a RAID controller from a single-controller system, ensure that your applications have been properly closed, users notified of the down time, all cached writes conducted, etc. All precautionary measures, without exception, are adhered to.



WARNING!

When inserting a removable module, take heed that **DO NOT USE EXCESSIVE FORCE!** Forcing or slamming a module can damage the connector pins either on the module itself or on the backplane. Gently push the module until it reaches the end of module slot. Feel the contact resistance and use slightly more force to ensure the module connectors are correctly mated. If the module comes with ejection levers or retention screws, use them to secure the module.

5.2. Replacing a Controller Module

5.2.1 Overview

Two replaceable components are contained in a controller module:

- **DIMM Module:** The DIMM module can be replaced when a DIMM module fails or if a larger capacity DIMM is required.
- **CBM:** As part of the CBM module, a BBU within is usually replaced every 3 years. If a BBU has lost its ability to hold electric charge, replace it with a certified module.



WARNING!

1. The BBU is not hot-swappable. BBU is contained in a RAID controller canister. To replace a BBU, you must remove a RAID controller. It is recommended to remove the BBU before replacing a DIMM module because once a controller is removed from chassis, BBU will discharge to support the cache memory. If you replace a DIMM module with supplied voltage, damage may occur.
 2. If necessary, replace a DIMM **1 minute** after the BBU is removed.
-

5.2.2 Notes on Controller Maintenance

- Re-using the DIMM module removed from a failed controller is not recommended unless you have a similar RAID system to test its integrity.
- When replacing the controller module, you must remember that the controller board is one of the most sensitive components in the system. All previously stipulated safety precautions (see **Chapter 2**) must be strictly adhered to. Failure to adhere to these precautions can result in permanent damage and timely delays.

5.2.3 Removing the Controller Module

To remove the controller module:

- Step 1.** Prepare a clean, static-free work pad or container to place the controller that will be removed from the chassis.

(Step 2 and Step 3 are for the single-controller system. Skip them if you are replacing a controller in the dual-controller S16E-R1240)

- Step 2.** **Make sure there is no access from host computers to the system to avoid losing data.** Stop all I/O accesses to the subsystem and make sure all cached writes have been

distributed to disk drives using firmware's **"Shutdown Controller"** function.

This function is accessed from **Main Menu** -> **"System Functions."**



- Step 3.** **Power off the system (For single-controller system only!).** Power off the system in the way described in **Chapter 4**. Be sure to flush all cached data before powering off the subsystem. If it is not possible to do this **turn off** both PSU modules and disconnect the power cords.
- Step 4.** **Disconnect all cables** that are connected to the controller module you wish to replace.
- Step 5.** **Loosen the retention screws from controller.** Use a medium-size Phillips screwdriver to remove the screws underneath each of the ejection levers. Keep the screws for future use.

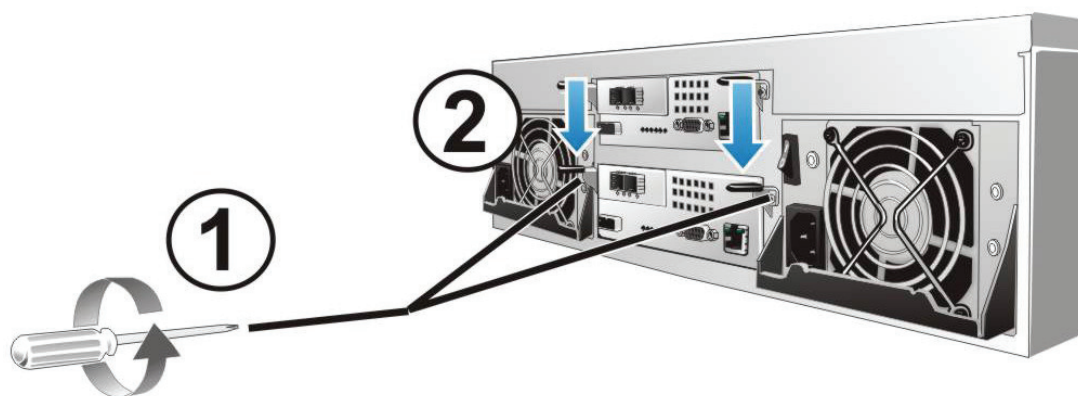


Figure 5-1: Loosening Controller Retention Screws

- Step 6.** **Remove the controller module** by pressing down the two ejection levers. The controller will be eased out of the module bay. Gently pull the controller module out of the subsystem with one hand underneath to support the weight of the module.

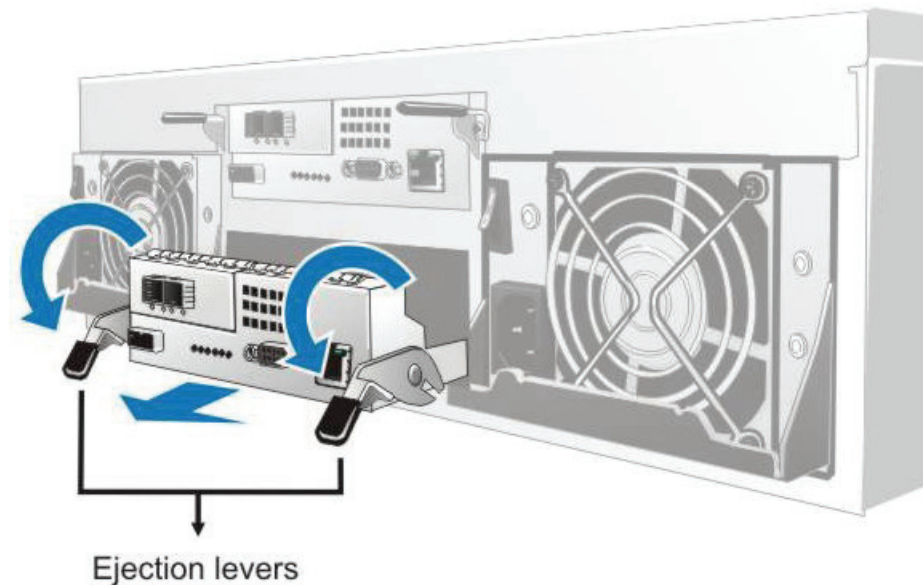


Figure 5-2: Removing the Controller Module

5.2.4 Replacing the Controller Module

If the controller module has failed, replace a failed controller with a replacement from your vendor:

- Step 1.** **Remove the failed controller.** (See [Section 5.2.3](#))
- Step 2.** **Install a DIMM module on the replacement controller, if it does not come with a DIMM.** (See [Section 5.3](#))
- Step 3.** **Insert the controller module.** Align the controller module with the controller module bay, making sure that the levers are down. Gently slide the controller module in.
- Step 4.** **Secure the connection.** When the controller is reaching the end and you feel the contact resistance, use slightly more force to mate the controller with backplane connectors. When the controller is almost fully inserted, use the ejection levers to secure the controller. The levers help ensure that the back-end connectors are properly mated.
- Step 5.** **Fasten the hand screws.** Once fully inserted, secure the controller module to the chassis by fastening the retention screws through the screw holes on the ejection levers.
- Step 6.** **Re-attach all the cables** that you previously disconnected.
- Step 7.** **7-1. Power up** the system if using a single-controller subsystem.

7-2. With a redundant-controller subsystem, RAID controllers should spend a short while negotiating with each other and then deliver a **“Redundant Controller Restored”** message.

You can check for this message on the LCD screen, GUI manager, or firmware text-based utility. When the replacement controller is successfully brought online, its Controller status LED should light green on its faceplate.

5.3. Replacing or Upgrading Memory Modules

5.3.1 Memory Module Installation Overview

- The system comes with a pre-installed 1GB (or above) DDR-II DIMM module. The controller supports a memory module up to 2GB in size. If you need a larger DDR-II module or the original DIMM module malfunctions in some way (often shown as the “NVRAM failure” event), the pre-installed module can be replaced. Replacement and installation instructions are described below.
- A DIMM socket is located on the controller main circuit board.



WARNING!

The controller board in the controller module is a sensitive item. Please ensure that all anti-static precautions stipulated above are strictly adhered to.

5.3.2 Selecting the Memory Modules

Compatibility: To avoid the compatibility issues, it is recommended to contact Infortrend or your system vendor for a compatible module. We provide tested modules from reliable vendors with reliable chips.

5.3.3 DIMM Module Installation

- Step 1.** Use of an ESD grounding strap is highly recommended.
- Step 2.** **Remove the controller module.** (See previous section for details).
- Step 3.** **Remove the BBU module,** if installed. Carefully place the module for it contains Li-ion batteries. Do not drop it to the floor or place it near any heat source.

- Step 4.** **Wait for one minute** for the remaining electricity on main board to disperse. **Remove the faulty module from the DIMM socket.** To do this, push the white module clips on either side of the DIMM socket down. The DIMM will be ejected from the DIMM socket.

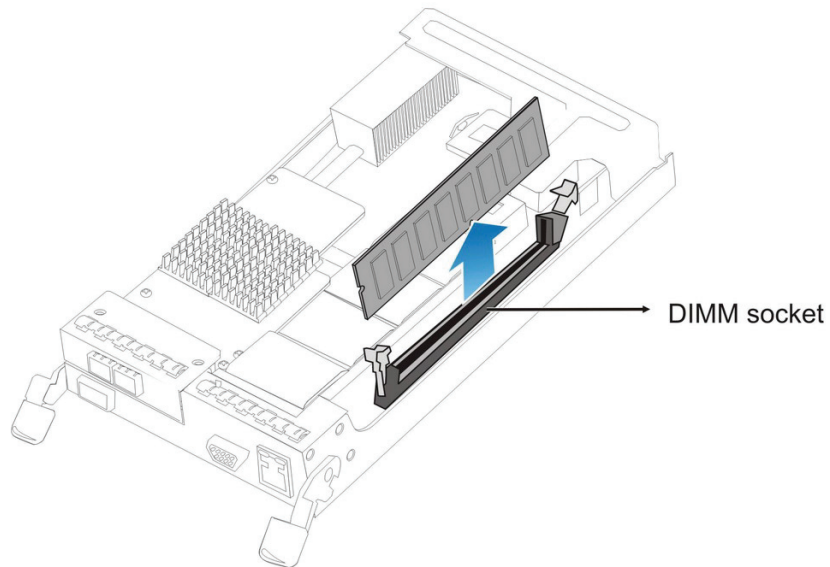


Figure 5-3: Removing a DIMM Module

- Step 5.** **Insert the replacement module into the DIMM socket.** Make sure the white clips of the DIMM socket are in the open positions. Align the DIMM module with the DIMM socket by checking its “keyed” position. Once aligned, gently and firmly push the DIMM module into the socket. The white clips on the sides of the socket will close automatically and secure the DIMM module into the socket.
- Step 6.** **Reinstall the BBU module.**
- Step 7.** **Reinstall the controller module.** After the DIMM module has been properly installed, install the RAID controller.
- 7-1. To do this, align the controller module with the controller module bay. Then gently push the controller module into the controller bay.
 - 7-2. Carefully push the controller until you feel the contact resistance when the board edge connectors are being mated to the backplane. Do not use force. If unusual contact resistance is felt, try it again.
 - 7-3. Use the ejection levers to secure it into the chassis when the controller is almost fully inserted.
 - 7-4. When the controller is inserted with the levers at its lowest position, notches on the levers should properly clinch to the round anchor pins on the interior walls of module bay. You

may then pull the lever upward to secure the controller into module bay.

- 7-5. Next secure the controller module into the chassis by fastening the screws through the screw holes on each ejection lever.

5.4. Replacing a Faulty CBM

The CBM module can sustain and transfer cached data to a flash SSD in the event of a power outage or in the unlikely event of failing both PSUs.

A BBU consists of a metal bracket, battery cell pack, and a PCB board that connects to the charger board. BBU supplies power during data transition from cache memory to flash. Please read the BBU handling precautions below before handling BBUs.

Fault Conditions:

A BBU failure can result from the following:

1. A BBU has lost its ability to hold electrical charge. This may be the case after the battery cells have been recharged for many times regardless of how long the module has been used. Therefore, a stable power source is important for system operation.
2. The charger circuitry implemented with the controller has failed.

There are other conditions that might trigger the BBU fault events and the BBU fault LED:

1. The temperature sensor on the system's charger circuit reports a temperature reading exceeding the preset threshold. The charger circuits will enter a low-power and self-protection state.
2. A BBU module has been charged for over twelve (12) hours. A timer is embedded with the charger. When this occurs, the charger will enter a timer fault state. This condition usually occurs with a brand new BBU or with a totally discharged BBU. Charging will resume automatically if you remove and re-install the BBU module.

5.4.1 BBU Warnings and Precautions

- Install or replace the BBU with BBUs supplied by your EonStor vendors only. Use of battery cells provided otherwise will void our warranty.
- Always dispose of a replaced battery in an ecologically responsible manner. Dispose of used BBUs at authorized battery disposal sites only.

- Do not place a BBU near a heat source. Heat can melt the insulation and damage other safety features of battery cells, possibly will cause acid leak and result in flames or explosion.
- Do not immerse the BBU in water nor allow it to get wet. Its protective features can be damaged. Abnormal chemical reactions may occur, possibly cause functional defects, acid leak, and other hazardous results.
- Do not disassemble or modify the BBU. If disassembled, the BBU could leak acid, overheat, emit smoke, burst and/or ignite.
- Do not pierce the BBU with a sharp object, strike it with a hammer, step on it, or throw it. These actions could damage or deform it and internal short-circuiting can occur, possibly cause functional defects, acid leak, and other hazardous results.
- If a BBU leaks, gives off a bad odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the subsystem and stop using it. If this is discovered when you first use the BBU, return it to Infortrend or your system vendor.

5.4.2 Replacing a Faulty BBU

To replace a BBU, please follow these steps:

- Step 1.** Remove controller as previously described.
- Step 2.** **Remove the faulty BBU from the chassis.** Loosen the captive screw at the end of BBU module.
- Step 3.** Install the replacement module by orienting its protruding edge on one side into the insertion slot, and lowering it towards the charger board.

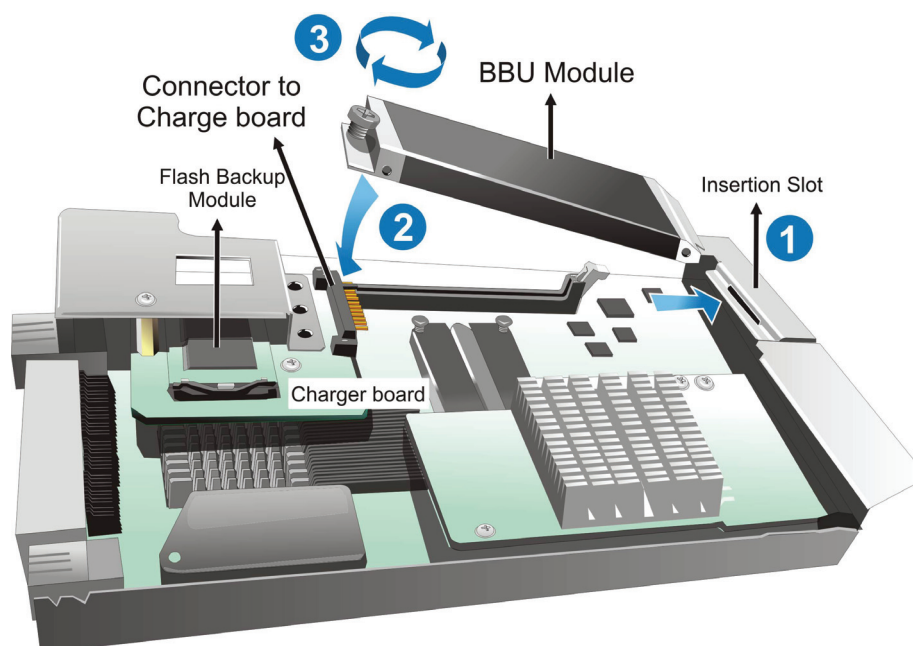


Figure 5-4: Installing BBU into a Controller

- Step 4.** Carefully align the BBU connector with that on the charger board. Press the BBU down to mate the connectors.
- Step 5.** Secure the BBU by fastening its captive screw.
- Step 6.** Re-install the controller.
- Step 7.** **Reset the system.** Find appropriate time to reset the system for the system firmware to recognize the replacement module. After a reset, the BBU LED will start flashing to indicate that the BBU is being charged. When the BBU is fully charged, the LED will be off.



NOTE:

1. A replacement BBU takes approximately twelve (12) hours to charge to its full capacity. Reset the system whenever a BBU is replaced or added in order for the replacement module to take effect.
2. The life expectancy of a BBU is 3 years. Follow the procedures above to replace a used BBU in order to maintain the fault tolerance feature.
3. The chance of BBU charger failure is comparatively low. If the cause of a failure cannot be determined even after a BBU module is replaced, contact your system vendor for a replacement controller and return the controller through Infortrend's standard RMA procedure.

5.4.3 Replacing a Faulty Flash

To replace a flash module, please follow these steps:

- Step 1.** Remove controller as previously described.
- Step 2.** **Remove the faulty flash from the charger board** using the index fingers from both hands to pull the retention clips away from the flash card. If the flash card does not easily disengage, use your finger nails to pick it up. Once released, the flash card will pop up. You can then remove it from the socket.
- Step 3.** Insert a replacement flash into the socket by a 30 degree angle. When fully inserted, press the flash card down until it is snapped by the retention clips.

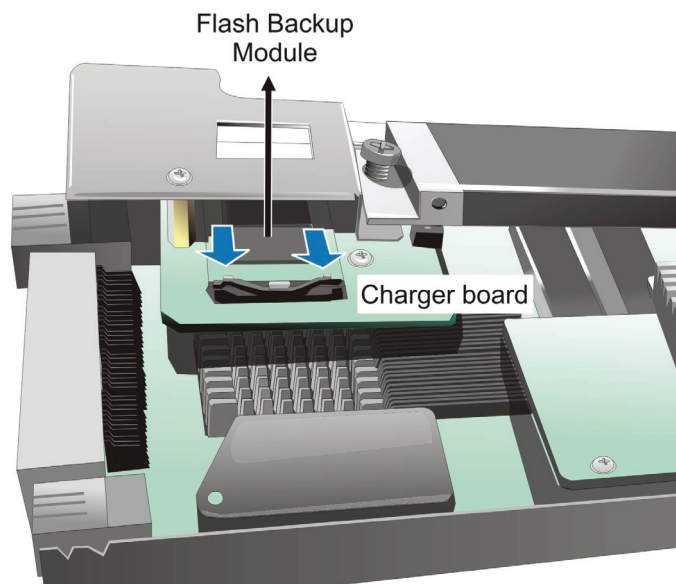


Figure 5-5: Installing Flash Card

5.5. Replacing a Faulty PSU

5.5.1 Notes on PSU Module Maintenance

- **Redundant, load-sharing PSU modules:** The system comes with two fully redundant, hot-swappable PSU modules.
- **PSU canister:** Each PSU module is housed in a robust steel canister, with the power supply converter unit in the front and two serially-aligned cooling fans in the rear section. When the PSU is removed from the chassis, the cooling module is also removed.

- **Immediate replacement:** When a PSU fails, it should ideally be replaced immediately. Do not remove the PSU module unless a replacement is readily available. Removing a PSU without a replacement will cause severe disruptions to the internal airflow and the system will overheat, possibly causing irreparable damage to some of the system components.

**WARNING!**

Although the system can operate using a single PSU module, it is not advisable to run the EonStor subsystem with a single PSU module for an extended period of time.

5.5.2 Replacing the PSU Module

To replace a PSU, please follow these steps:

- Step 1.** **Power off the PSU.** The power switch is located on each PSU's rear-facing panel. (See **Figure 5-6**)
- Step 2.** **Disconnect the power cord** that connects the PSU to the main power source.
- Step 3.** **Loosen the retention screw** that secures the extraction handle to the chassis using a Phillips screwdriver. See below drawing for its location.

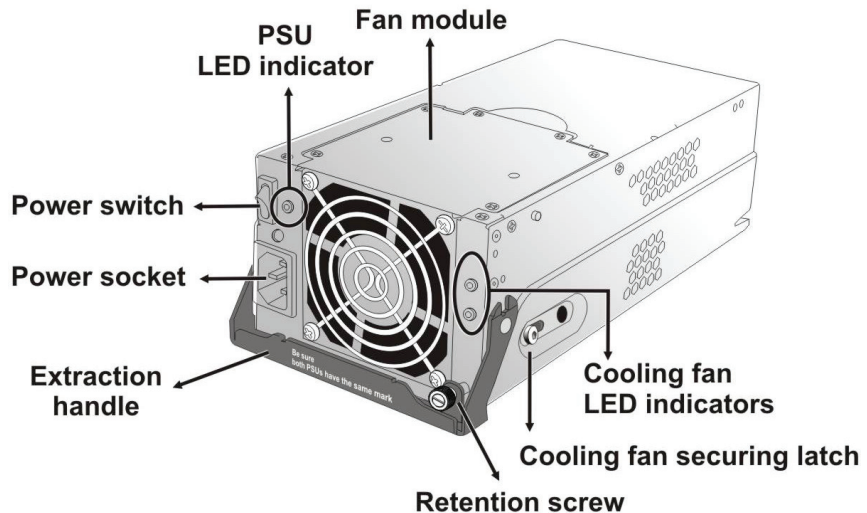


Figure 5-6: PSU Parts Identification

- Step 4.** **Remove the PSU module** by pulling the extraction handle upwards. The extraction handle should gracefully disconnect the PSU from the backplane connectors. Once dislodged, gently pull the PSU module out of the system. If the system is

mounted in a rackmount rack, use another hand to support its weight while removing the module. (See **Figure 5-7**)

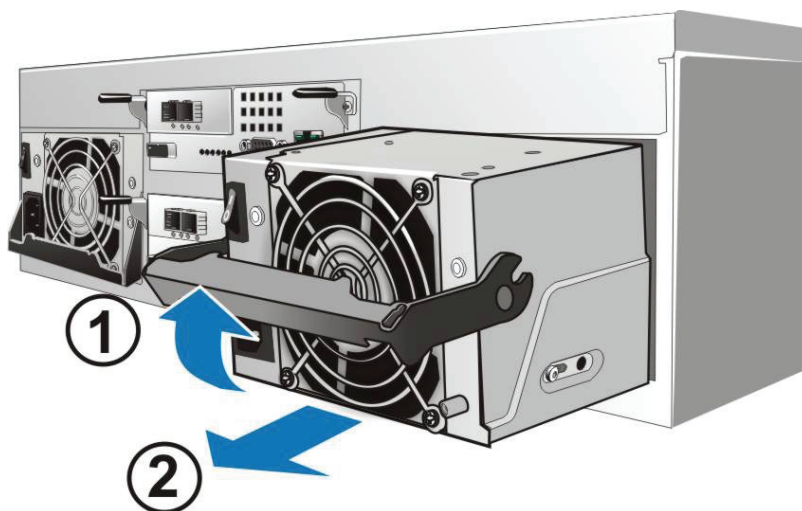


Figure 5-7: Removing the PSU Module



WARNING!

1. When a PSU is removed from the chassis, the cooling module is also removed from the chassis.
2. It is recommended that the replacement procedure is completed in less than five (5) minutes to prevent the subsystem from overheating.

Step 5. Install the replacement module. Make sure the extraction handle is held at its up-most position so that the saddle notches on the sides of the handle can snap onto the metal anchor pins on the interior walls of the PSU slot. Push the PSU into chassis, and when you feel the contact resistance, push the handle downward to secure the module.

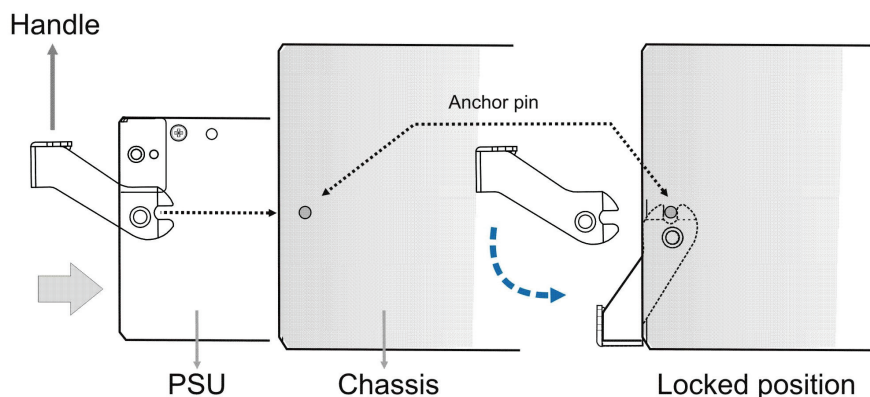


Figure 5-8: Securing PSU Using the Extraction Handle

Step 6. Secure the PSU to the system by fastening the retention screw through the PSU extraction handle.

- Step 7.** **Replace the power cord** that connects the PSU module to the mains.
- Step 8.** **Secure the power cord connection** using the included cable clamp.
- Step 9.** **Power on the PSU module.**

5.6. Replacing a Hard Drive

5.6.1 Hard Drive Maintenance Overview

- **Hot-swappable drive trays:** The drive trays are all hot-swappable. A disk drive failure can be corrected online.
- **Handles:** If a faulty drive is behind either the left- or right-side front handle, unfold the handles to open the front access to the drive trays.



CAUTION!

Failure to remove a healthy drive from the system after the front bezel has been opened can cause data errors.

-
- **Slow and careful removal:** When removing a drive tray from the subsystem, **pull the drive tray out only about one inch and then wait for at least 30 seconds for the hard drive motor to spin down before taking it out completely.** Any impact to the hard drive while the drive motor is spinning can damage the hard drive.

There are situations that healthy drives can be removed. In operations such as Copying & Replacing member drives with drives of larger capacity, you may need the replaced disk drives in other installations.

5.6.2 Replacing a Hard Drive

To replace a hard drive, please follow these steps:



WARNING!

Hard drives are fragile; therefore, always handle them with extreme care.

- Do not drop the hard drive.
- Always be slow, gentle, and careful when handling a hard drive.
- Handle a hard drive only by the edges of its metal cover, and avoid touching its circuits part and interface connectors.

Step 1. **Identify the location of the drive tray** that contains a hard drive indicated as faulty. You may use firmware utility or SANWatch software to locate a faulty drive. The drive tray LED should also light red.



WARNING!

Removing the wrong drive can fatally destroy a logical drive.

Step 2. Use a flatblade screwdriver to turn **the rotary bezel lock to the unlocked position**, i.e., the groove on its face is in a horizontal orientation.

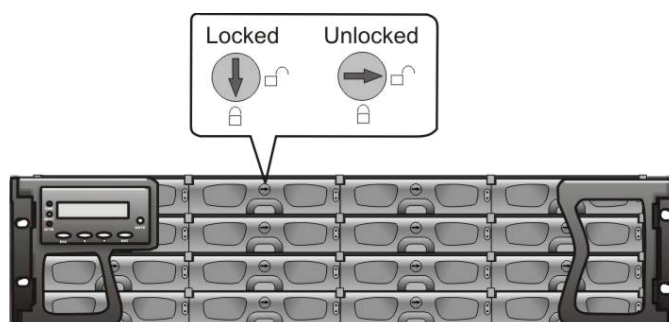


Figure 5-9: Opening the Front Flap

Step 3. **Open the tray bezel** by pushing the release button. The front bezel will automatically swing open.

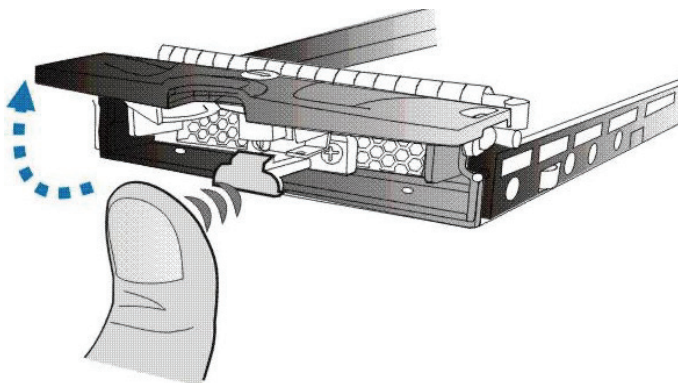


Figure 5-10: Opening the Drive Tray Front Bezel

Step 4. Remove the drive tray by pulling it one inch away from the drive bay. Wait for at least 30 seconds for the disk drive to spin down (if the disk drive is removed for a different purpose, e.g., cloning the members of a logical drive or Copy & Replace), and then gently and carefully withdraw the drive tray from the chassis.

Step 5. Remove the four (4) retention screws that secure the hard drive from the sides of the drive tray (two on each side.)

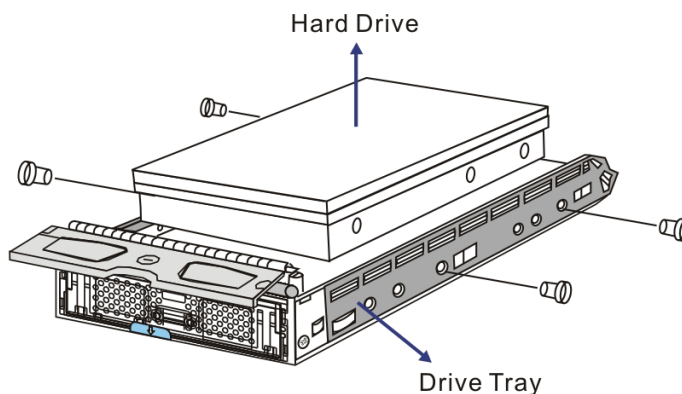


Figure 5-11: Loosening the Hard Drive Screws

Step 6. Place the replacement drive into the drive tray (as shown below), making sure that the interface connector is facing the open side of the drive tray, and the label side facing up.

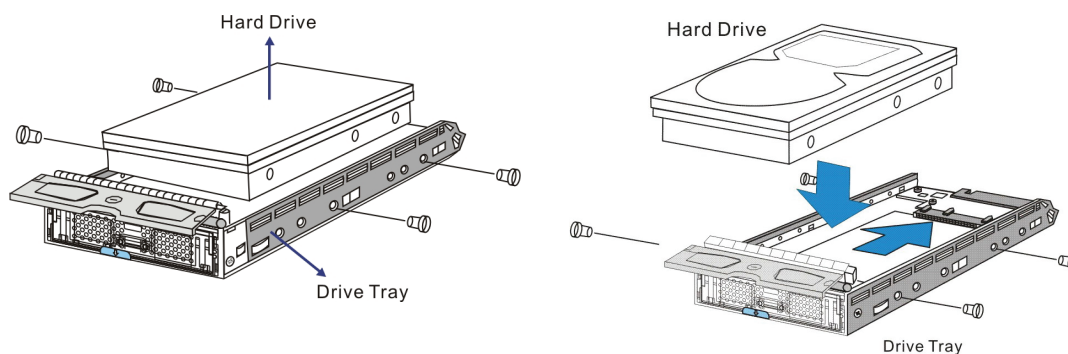


Figure 5-12: Installing a Hard Drive

Step 7. Adjust the drive's location until the mounting holes in the drive canister are aligned with those on the hard drive. Screws

holes used for the installation with or without a MUX board are different.

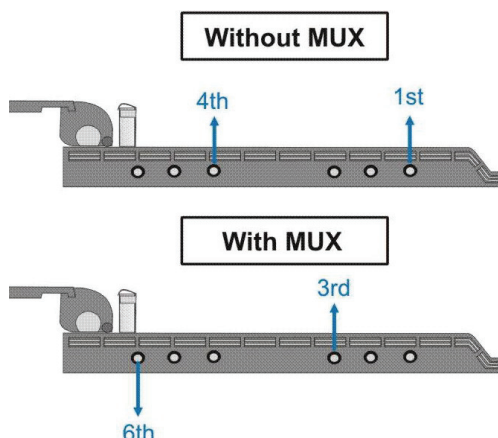


Figure 5-13: Drive Locations with and without the MUX Board

- Step 8.** Secure the disk drive with four (4) of the supplied 6/32 flat-head screws.
- Step 9.** **Align the drive tray with a drive bay.** Gently slide it in until the drive tray reach the end of drive bay. This should be done smoothly and gently.

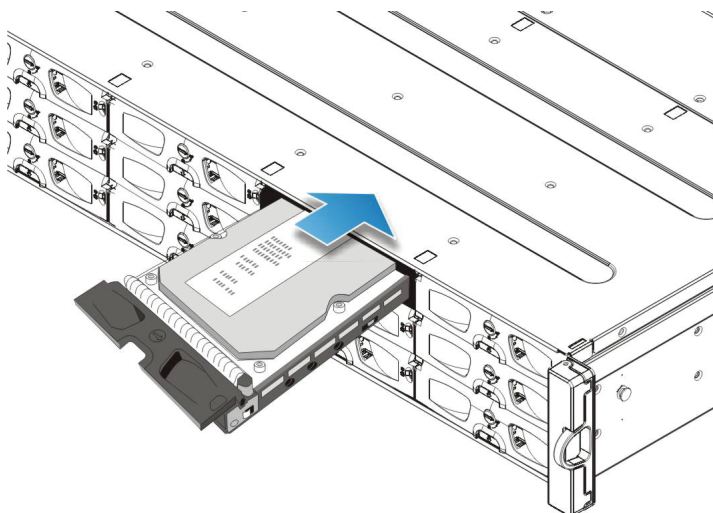


Figure 5-14: Installing a Drive Tray

- Step 10.** **Close the front bezel.** Make sure the front bezel is closed properly to ensure that the back-end connector is properly mated with the corresponding connector on the backplane. If the front bezel can not closed properly, the connection between the hard drive and the system may come loose and mysterious drive signals may result.
- Step 11.** **Lock the bezel into place** by turning the key-lock until the groove on its face is pointing down (vertical orientation).
- Step 12.** The drive Busy LED will light up after a few seconds meaning the system is attempting access. If the replaced drive belonged to a logical drive with fault tolerance, e.g., RAID

levels 1, 3, 5, or 6, a logical drive rebuild process will automatically begin. You should then verify the beginning of the rebuild process using management software or terminal console. A firmware message, "Rebuilding LD_," should also pop up on the LCD screen.

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Appendix A

Specifications

NOTE: For firmware related features, such as iSCSI trunk or MC/S grouping, please refer to **Firmware Operation manual**.

A.1. Technical Specifications

Environmental Specifications	
Humidity	5 to 95% (non condensing – operating and non-operating)
Temperature	Operating: 0° to 40°C (35°C if BBU is applied) Non-operating: -40° to 60°C
Altitude	Operating: Sea level to 12,000ft Packaged: Sea level to 40,000ft

Power Requirements	
Input Voltage	100VAC @ 10A 240VAC @ 5A with PFC (auto-switching)
Frequency	47 to 63Hz
Power Consumption	530W; idle: 345W; Busy: 367W

Dimensions		
	With Forearm Handles (and PSU protrusions)	Without Forearm Handles
Height	131mm (5.2 inches)	130mm (5.1 inches)
Width	482.6mm (19 inches)	445mm (17.5 inches)
Length	531.64mm (20.9 inches)	514.04mm (20.1 inches)

Certifications

Safety

UL (60950-1 2'nd)

BSMI

CNS 14336: 1993

CB IEC 60950-1, 2'nd Edition

GOST-R GOST60950

EMC

CE

EN 55022: 2006/A1:2007

EN 61000-3-2: 2006

EN 61000-3-3: 1995/A1: 2001 /A2: 2005

EN 55024: 1998/A1: 2001/A2: 2003

FCC (FCC Part 15, subpart B)

BSMI (CNS 13438)

FCC (FCC Part 15,subpart B)

Certificates

- IEC 60068-2,
- MIL-STD-810E/883E,
- ISTA,
- ASTM-D3332,
- IPC-TM-650
- IEC 61000-4
- IEC 61000-3-2, IEC61000-3-3
- ISO7779/3744

- RoHS
- Microsfot WHQL-WindowsServer 2003

Shock

Half-sine

Operating: 5G peak, 11ms duration

Non-operating: 15G, 11ms duration

Vibration

Operating

0.5oct/min, 5 to 500Hz, sinewave, 0.2G

Non-operating

0.5oct/min, 5 to 500Hz, sinewave, 1.0G

- Various tests have been conducted according to industry standards. Please contact your sales representatives or visit our VIProom website for individual test reports.

Warning Alarms

- Audible alarms
- System LEDs
- Event notification via the SANWatch Manager (LAN broadcast, Email, Fax, MSN, SMS, and SNMP traps)
- Event prompts in RS-232C terminal console
- LCD event prompts
- Event prompts in Telnet console

A.2. Controller Specifications

A.2.1 Configuration

Specification	
RAID Levels	0, 1(0 + 1), 3, 5, 6, 10, 30, 50, 60, and non-RAID disk spanning
Host O/S Compatibility	Host O/S independent
Host Interface	10Gb/s Ethernet as iSCSI host channels
Host Channels	2 pre-configured host channels per controller
Drive Interface	Supports up to 16 channels of 3Gbps SAS or SATA-II
Drive Channels	All drive channels are pre-configured and cannot be changed
Cache Mode	Write-through, write-back, and adaptive write policy
Cache Memory	Pre-installed 1GB (or above) DDR-II module with ECC, registered; in one DIMM socket
Number of LUN's	Up to 32 per host ID, for a total of 1024 on all host channels
Multiple Target IDs/Host Channel	Yes
Firmware on Flash Memory	Yes

A.2.2 Architecture

Specification	
CPU	2 RISC-based CPUs
Host Channel Chip Controllers	Intel chipsets

DIMM Slot	For one 240-pin DDR-II SDRAM module
ASIC	Infortrend ASIC667 64-bit chipset
Flash ROM	64Mbit (8MB)
Hardware XOR	Yes
Real-time Clock	For event messages with time record and task scheduling

A.3. Power Supply Specifications

Specification	
Nominal Power	530W with active PFC
DC Output	12.0V: 43A (Max.) 5.0V: 25A (Max.)
Efficiency	80plus
Input Frequency	47 to 63Hz
AC Input	100VAC @ 10A or 240VAC @ 5A with PFC
Power Factor Correction	Yes
Hold-up Time	At least 20ms at 115/230VAC full load after a loss of AC input
Over-temperature Protection	Auto shutdown when lost cooling or exceeded ambient temperature; over-voltage protection is also available.
Cooling Fans	No fans specific for PSU; heated air is drawn by the cooling fan module fixed in the rear section of PSU.

A.4. RAID Management

Specification	
Configuration	• Text-based firmware-embedded utility over RS-232C through a DB-9 male to DB-9 female serial cable • LCD keypad panel • The SANWatch Manager program using the management port (10/100BaseT) or in-band connection • Text-based firmware-embedded utility via telnet
Performance Monitoring	Yes
Remote Control and Monitoring	Yes
Event Broadcast/Alert	Yes (via SANWatch sub-modules, the Notification Manager utility, or the firmware-embedded browser-based Embedded RAIDWatch)
Hardware Connection	over Ethernet or RS-232C
Configuration on Disk	Configuration data stored on disks for logical drive assemblies to exist after controller replacement; basic settings, e.g., channel mode settings, are stored on NVRAM. Applies to uses such as Drive Roaming.
Failure Indicator	Via audible alarm, LCD keypad panel, SANWatch Manager session, event messages, or terminal emulation

A.5. Fault Tolerance Management

Specification	
Drive S.M.A.R.T. support	Yes, with user-configurable detect-only, clone-and-replace, and perpetual-clone options. The S.M.A.R.T. feature depends on HDD implementation.
CBM (Cache Backup Module)	Yes
Sensors and Module Presence detection through an I ² C serial bus.	Yes, reported to firmware
Automatic Drive Failure Detection	Yes
Automatic Rebuild on Spare Drives	Yes
Regenerate Logical Drive Parity	Yes
Bad Block Reassignment	Yes
Automatic Rebuild upon Failed Drive Replacement	Yes
Manual Clone of Suspected Failed Drive	Yes
Concurrent Rebuild on Multiple	Yes

Drives in a RAID (0 + 1) or RAID6 Logical Drive	
Event-triggered operation	Firmware applies conservative write-through operation in the event of module failures, and raises fan rotation speed.

Appendix B

Pinouts

B.1 10GbE iSCSI Host Port

20-pin MSA-compliant SFP connectors that receive SFP+ transceivers. This is a standard connector and hence no pinouts is provided.

B.2 10/100BaseT Ethernet Port Pinouts (Management Port)

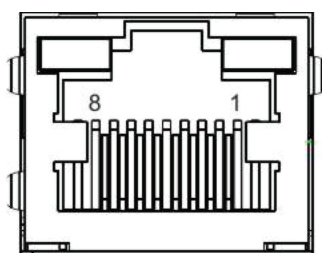


Figure B-1: 10/100BaseT Ethernet Port

Pin	Pin Name	Color Match
1	LAN_TXP	Orange
2	LAN_TXN	Orange/white
3	LAN_RXP	Green
4	N2	Blue/white
5	N2	Blue
6	LAN_RXN	Green/white
7	N1	Brown
8	N1	Brown/white

Table B-1: 10/100BaseT Ethernet Port Pinouts

B.3 DB-9 Serial Port

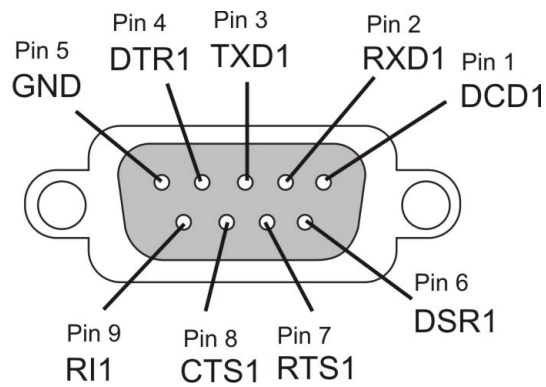


Figure B-2: COM1 Serial Port

Pin	Pin Name	Description
1	DCD1	Data Carrier Detect
2	RXD1	Receive Data
3	TXD1	Transmit Data
4	DTR1	Data Terminal Ready
5	GND	Ground
6	DSR1	Data Set Ready
7	RTS1	Request to Send
8	CTS1	Clear to Send
9	RI1	Ringing indicator

Table B-2: Serial Port Pinout Definitions

For a single-controller system, there is no included cable for this serial port. The serial cable is user-supplied.

B.4 Serial Port Y-Cable

The DB-9 to DB9 Y-cable connects the COM1 serial ports on redundant RAID controllers for maintenance-free terminal connection during controller failover/failback.

IFT-9373AYCab

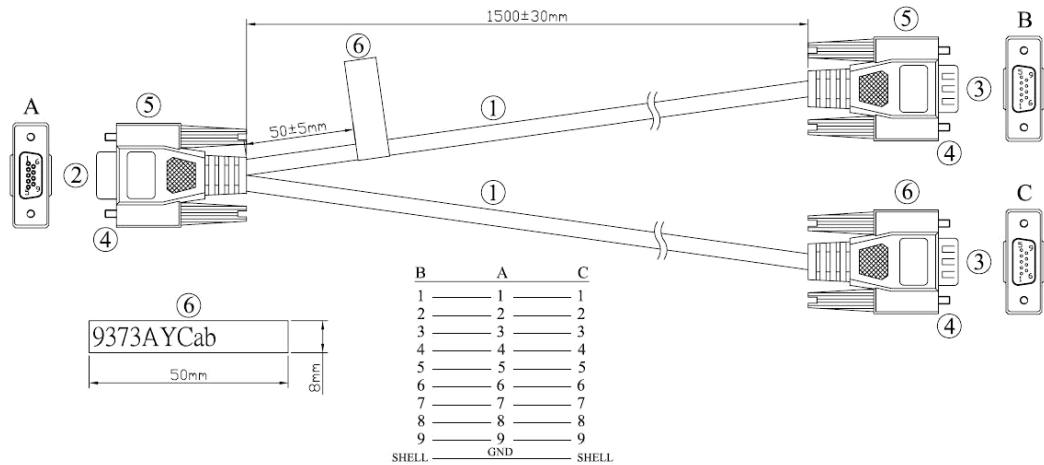


Figure B-3: Serial Port Y-Cable

B.5 SAS Expansion Port Pinouts

The Mini SAS expansion port complies with SFF-8088 specifications.

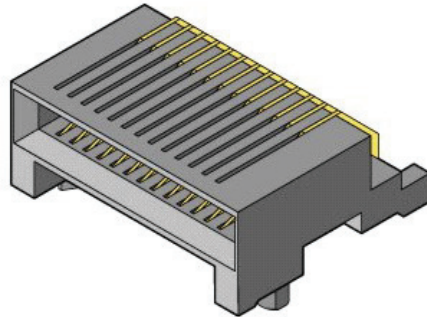


Figure B-4: Mini SAS SFF-8088 Connector

Pin	Description	Pin	Description
A1	GND	B1	GND
A2	RX0+	B2	TX0+
A3	RX0-	B3	TX0-
A4	GND	B4	GND
A5	RX1+	B5	TX1+
A6	RX1-	B6	TX1-
A7	GND	B7	GND
A8	RX2+	B8	TX2+
A9	RX2-	B9	TX2-
A10	GND	B10	GND
A11	RX3+	B11	TX3+
A12	RX3-	B12	TX3-
A13	GND	B13	GND

Table B-3: SAS Expansion Port Pinout Definitions

B.6 Power

IEC-type receptacles. Unless specified otherwise, cable type will be determined by the shipped-to area.

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